VPDES PERMIT FACT SHEET

This document gives the pertinent information concerning the **reissuance** of the VPDES permit listed below. This permit is being processed as a **minor municipal** permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et seq.

The discharge results from the operation of a **0.009 MGD extended aeration wastewater treatment system** for Mountain Lake Biological Research Station. This permit action consists of revising the BOD_5 and dissolved oxygen limits and special conditions. (SIC Code: 4952)

1. **Facility Name and Address:**
   Mountain Lake Biological Research Station WWTP
   335 Salt Pond Road
   Pembroke, VA 24136-9724
   Location: 335 Salt Pond Road (State Road 668)

2. **Permit No: VA0075361** Existing Permit Expiration Date: March 16, 2013

3. **Owner/ Facility Contacts:**
   Jeffrey A. Sitler, CPG, Director of Environmental Compliance Programs, University of Virginia, (434) 982-4901; sitler@virginia.edu
   Brian White, Plant Operator, Environmental Systems Service, LTD; (540) 862-2503; Brianw-ess@lumnos.net

4. **Application Complete Date:** August 23, 2012
   Permit Drafted By: Becky L. France, Water Permit Writer
   Date: January 8, 2013 (Revised 1/16/13)
   DEQ Regional Office: Blue Ridge Regional Office
   Reviewed By: Kevin A. Harlow, Water Permit Writer
   Reviewer's Signature: _____ Date: 1/25/13
   Public Comment Period Dates: From 2/1/13 To 3/4/13

5. **Receiving Stream Classification:**

Receiving Stream:	Hunters Branch, UT (River Mile: 0.20)		
Watershed ID:	VAW-N24R (New River/Little Stony Creek Watershed)		
River Basin:	New River		
River Subbasin:	None		
Section:	1d		
Class:	VI		
Special Standards:	None		
7-Day, 10-Year Low Flow:	0 MGD	7-Day, 10-Year High Flow:	0 MGD
1-Day, 10-Year Low Flow:	0 MGD	1-Day, 10-Year High Flow:	0 MGD
30-Day, 5-Year Low Flow:	0 MGD	Harmonic Mean Flow:	0 MGD
Tidal:	No	303(d) Listed:	No

Attachment A contains a copy of the flow frequency determination memorandum.

6. **Operator License Requirements:** IV

7. **Reliability Class:** I

8. **Permit Characterization:**

( )	Private	( )	Interim Limits in Other Document
( )	Federal	( )	Possible Interstate Effect
(X)	State		
(X)	POTW		
( )	PVOTW		

9. **Wastewater Treatment System:** A description of the wastewater treatment system is provided below. See **Attachment B** for wastewater treatment schematics and **Attachment C** for a copy of the site inspection report. The treatment units associated with the discharge are listed in the table below.

Table I
DISCHARGE DESCRIPTION

Outfall Number	Discharge Source	Treatment (Unit by Unit)	Flow (Design) (MGD)
001	Mountain Lake Biological Research Station WWTP	bar screen flow equalization basin soda ash feed system aeration basin clarifiers (2) tablet chlorinator tablet dechlorinator post aeration tank sludge holding tank	0.009 MGD

Mountain Lake Biological Research Station operates an extended aeration plant. The treatment plant was built in the mid 1960s to treat 15,000 gpd of wastewater. Modifications in 1993 reduced the design capacity to the current 9,000 gpd. In response to operational problems in 2009, modifications were completed prior to the 2011 operational season.

The treatment system serves receives wastewater from the teaching facility, dining hall, residential cottages, and caretaker's cottage. Grease from the cafeteria is collected in a baffled grease trap. The table above lists the treatment units for this activated sludge treatment works. After dechlorination, effluent is discharged into an unnamed tributary to Hunters Branch.

10. **Sewage Sludge Use or Disposal:** A VPDES Sewage Sludge Permit Application Form was submitted for this facility to address disposal of sewage sludge from the wastewater treatment

facility. Sludge is aerobically digested and periodically transported to the Peppers Ferry Regional Wastewater Treatment Authority for further treatment.

11. **Discharge Location Description:** A USGS topographic map which indicates the discharge location, any significant dischargers, any water intakes, and other items of interest is included in **Attachment D**. The latitude and longitude of the discharge are N 37°22'29.99", E 80°31'36.98".

Name of Topo: Eggleston Number: 112D

12. **Material Storage:** Hydrated lime, calcium hypochlorite tablets, and sodium sulfite tablets are stored in a small building beside the treatment facility.

13. **Ambient Water Quality Information:** Memoranda or other information which helped to develop permit conditions (special water quality studies, STORET data, and any other biological and/or chemical data, etc.) are listed below.

Flow Frequency Data
Mountain Lake Biological Research Station discharges to a dry ravine, and the effluent flows about 180 feet to Hunters Branch. This intermittent segment of Hunters Branch is 6,000 feet upstream of the confluence with Pond Drain. The distance from the discharge to perennial stream, Pond Drain, is 1.17 miles. Pond Drain flows into Little Stony Creek which is a tributary to the New River. Flow frequencies for the point where the stream becomes perennial are needed to determine antidegradation baselines. They are estimated using the USGS continuous record gauge on Wolf Creek near Narrows, Virginia (#03175500). The gauge is located at the Route 724 bridge in Giles County, Virginia. The values at the perennial point were determined by drainage area proportions.

Receiving Stream Classification
The discharge is located in the New River/ Little Stony Creek Watershed (VAW-N24R). The Water Quality Standards (9 VAC 225-260) identifies all named and unnamed tributaries to Little Stony Creek as Class VI natural trout streams. The stream standards for trout streams apply to Hunters Branch. For this Class VI stream, a minimum dissolved oxygen standard of 7.0 mg/L and a maximum temperature standard of 20 °C applies.

A segment of the New River from the I-77 bridge to the VA/WVA state line (including Peak Creek and Reed Creek) has been classified as impaired due to PCBs in fish tissues. A PCB TMDL will be prepared for the watersheds which include Stony Creek (**Attachment E**). The discharge from Mountain Lake Biological Research Station WWTP is located in the watershed TMDL study area, but no PCB TMDL allocation is expected because this facility is not believed to contribute to PCB contamination in the watershed.

Stream Water Quality Data
Data for STORET Station 9-LRY000.28 were collected in Little Stony Creek downstream from the discharge point. This STORET Station is located along Route 623 approximately 1.5 miles

north of the Town of Pembroke and the confluence with the New River. The instream 90th percentile pH for the antidegradation wasteload allocations was determined from these data. Results of a 1997 DEQ benthic survey conducted below the wastewater treatment facility are also included in **Attachment E**.

Endangered Species Evaluation

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has identified natural heritage resources in the project area. However, DCR believes that "due to the scope of the activity and the distance to the resource,...<they> do not anticipate that this project will adversely impact these natural heritage resources." Also, the Virginia Department of Game and Inland Fisheries (VDGIF) commented that as long as there are no changes to the existing effluent characteristics and the permit limits are protective of wild trout waters, they do not anticipate the reissue will result in adverse impact to the trout waters and associated species. The U.S. Fish and Wildlife Service's review did not find any impacts to federally listed species or designated critical habitat.

14. **Antidegradation Review and Comments:** Tier 1 **X (intermittent)** Tier 2 **X (perennial)** Tier 3 _____

The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with Tier determination. The facility discharges through a dry ravine to Hunters Branch. Since there is a potential for Hunters Branch to contain no stream flow, so the intermittent section of Hunters Branch is classified as a Tier 1 water, and existing uses of the water body and the water quality to protect these uses must be maintained. The permit limits are established by determining wasteload allocations that will result in attaining and/or maintaining all water quality criteria that apply in accordance with Section 303(d)(4) of the Clean Water Act.

Hunters Branch reaches the perennial section of Pond Drain 1.17 miles from the discharge point. The antidegradation review pertains to the perennial section of Pond Drain. This segment of Pond Drain is not listed on Part I of the 303(d) for exceedance of water quality criteria. Available stream data from STORET monitoring station located downstream of the discharge on Little Stony Creek downstream from the confluence with Pond Drain have been compared with the water quality criteria (**Attachment E**). All pH, dissolved oxygen, and ammonia data were below the water quality criteria. In 1997, a DEQ benthic survey conducted below the wastewater treatment facility found no measurable environmental impact (**Attachment E**). Based upon

these results, this segment is determined to be a Tier 2 waterbody, and no significant degradation of existing water quality is allowed.

For purposes of aquatic life protection in Tier 2 waters, "significant degradation" means that no more than 25 percent of the difference between the acute and chronic aquatic criteria values and the existing quality (unused assimilative capacity) may be allocated. For purposes of human health protection, "significant degradation" means that no more than 10 percent of the difference between the human health criteria and the existing quality (unused assimilative capacity) may be allocated. The antidegradation baselines for aquatic life and human health are calculated for each pollutant as follows:

Antidegradation baseline (aquatic life) = 0.25 (WQS – existing quality) + existing quality

Antidegradation baseline (human health) = 0.10 (WQS – existing quality) + existing quality

Where:
"WQS" = Numeric criterion listed in 9 VAC 25-260-5 et seq. for the parameter analyzed
"Existing quality" = Concentration of the parameter being analyzed in the receiving stream

These antidegradation baselines become the new water quality criteria in Tier 2 waters, and effluent limits for future expansions or new facilities must be written to maintain the antidegradation baselines for each pollutant. Antidegradation baselines have been calculated as described above and included in **Attachment F**. Stream and effluent data used in the antidegradation wasteload spreadsheet calculations are included in **Attachment E** and **Attachment F**, respectively. The 90th percentile pH and average hardness values for the perennial segment of Pond Drain are based on STORET data from Station 9-LRY000.28 located downstream from this discharge point. The effluent 90th percentile effluent pH was based upon Discharge Monitoring Report (DMR) data submitted between June 2004 and July 2007. In the absence of temperature data at the point where the discharge reaches Hunters Branch, the trout stream temperature standard was used as the 90th percentile effluent temperature.

Mountain Lake Biological Research Station WWTP was built in the mid 1960s to treat 15,000 gpd. The plant was modified in 1993 to lower the design capacity to 9,000 gpd. Modifications were made to the treatment plant to optimize treatment in 1996, 2001, and 2010. However, none of these modifications resulted in an increase in the design capacity. This discharge began prior to the antidegradation policy requirements set forth in the Clean Water Act on November 28, 1975. Existing grandfathered facilities that propose an expansion or an increase in the discharge of pollutants are subject to antidegradation requirements. This facility's discharge is existing, and the application does not indicate an expansion or proposed increase in the discharge of pollutants via this outfall. Therefore, the antidegradation baselines do not apply to this reissuance. Note that if the permittee proposes an increase in design capacity, these antidegradation wasteload allocations would need to be modified to reflect a new effluent design flow. Permit limits are written to meet the water quality standards. So, the permit limits are in compliance with the antidegradation requirements set for the in 9 VAC 25-260-30.

15. **Site Inspection:** Date: 7/29/11 Performed by: Becky L. France
Attachment C contains a copy of the site inspection memorandum. The last DEQ technical compliance and laboratory inspection was conducted by Ryan Hendrix on August 6, 2009.

16. **Effluent Screening and Limitation Development:** DEQ Guidance Memo 00-2011 was used in developing all water quality based limits pursuant to water quality standards (9 VAC 25-260-5 et seq). Refer to **Attachment F** for the wasteload allocation spreadsheet and effluent limit calculations. See **Table II** on page 16 for a summary of limits and monitoring requirements and **Table III** on page 17 for details on changes to the effluent limits and monitoring requirements.

A. **Mixing Zone**

The effluent is discharged to a dry ravine to Hunters Branch. A mixing zone was not applicable to determining toxic limitations in the intermittent section. This tributary reaches Pond Drain approximately 1.17 miles from the discharge point. Pond Drain is shown on the topographic map as perennial. Mixing zones may be allowed in perennial waters providing the antidegradation requirements for the waters are met. For the purpose of determining antidegradation baselines for the perennial section, the Agency mixing zone program, MIXER, was run to determine the percentage of the receiving stream flow that could be used in the antidegradation wasteload allocation calculations. The program indicated that 100 percent of the 1Q10 and 7Q10 may be used for calculating the antidegradation acute and chronic wasteload allocations (AWLAs). A copy of the printout from the MIXER run is enclosed in **Attachment F**.

B. **Effluent Limitations for Conventional Pollutants**

Flow –The permitted design flow of 0.009 MGD for this facility is taken from the previous VPDES permit and the application for the reissuance. In accordance with the current VPDES Permit Manual, flow is to be estimated and reported each day of discharge.

pH –The pH limits of 6.0 S.U. minimum and 8.2 S.U. maximum have been continued from the previous permit term. This range is more stringent than the Virginia Water Quality Standards (9 VAC 25-260-50) and the federal technology-based guidelines, 40 CFR Part 133, for secondary treatment which is between 6.0 S.U. and 9.0 S.U. The maximum pH limitation was changed during the November 14, 2000 permit modification to optimize nitrification and balance that against lower ammonia wasteload allocations calculated from the higher pH effluent. Grab samples shall be collected once per discharge day.

Biochemical Oxygen Demand ($cBOD_5$), Dissolved Oxygen (DO) – The dissolved oxygen was below the minimum limit of 7.1 mg/L in the months of May 2009, June 2009, October 2009, May 2011, and June 2011. During the 2012 operational season from May 2012 through August 2012 all of the DO values met the minimum DO level.

There have been no exceedances of the $cBOD_5$ limits during the 2008 through 2012 operational seasons (**Attachment F**). The permittee has asked that the dissolved oxygen minimum limit be lowered so that they can more consistently comply with the limit. In order to lower the DO limit, the $cBOD_5$ will also need to be lowered to prevent a DO sag in the receiving stream below the natural trout stream dissolved oxygen standard of 7.0 mg/L. Since the permittee's $cBOD_5$ data were significantly lower than the current limits, lowering these limits is practical. The previous permit was run with a 90th percentile effluent temperature value of 19 ^{O}C. Effluent temperature data was higher than the previous permit term, so it was necessary to rerun the DO model with a revised temperature value.

The DEQ Regional Water Quality Model default assumptions for reearation rate are not adequate to model this fast moving mountain stream. Therefore, model coefficients for reaeration and cBOD decay were customized to reflect the characteristics of the shallow, fast moving mountainous stream. The discharge is released into a dry ravine and flows approximately 600 feet before leaving the property and then another 600 feet to Hunters Branch. The first 1200 feet is a dry ditch and Hunters Branch is an intermittent stream. Since the dry ditch is a conveyance channel, the temperature standards for the trout stream begin at Hunters Branch. The permittee recorded effluent temperature data and some of the temperature data during the summer months exceeded the temperature standard for Hunters Branch. However, there is no temperature data in Hunters Branch. There is some shading along the stream channel, and the tanks in the wastewater treatment system are open to solar radiation. So, the effluent temperature is not necessary reflective of the temperature for Hunters Branch. Therefore, the natural trout stream temperature standard, 20 °C, was used as the model input. Streeter-Phelps model equations have been included in a spreadsheet used to predict the dissolved oxygen deficit. **Attachment G** contains the input data and a summary of the results.

The table that follows shows the results of several model calculations. An initial DO concentration of 7.10 mg/L and a $cBOD_u$ of 42 mg/L were used in the model input. The model predicted a DO sag to 6.98 mg/L violating the DO standard (7.0 mg/L). When the input $cBOD_u$ was decreased to 41 mg/L and the minimum DO was decreased to 7.00 mg/L, the model predicted a low DO of 7.00 mg/L. Due to the high reaeration rate, the model predicts this dissolved oxygen "sag" near where the discharge leaves the property. These last model inputs result in a DO that complies with the DO standard. As described in the DEQ Documentation and Users Manual for the Regional Water Quality Model for Free Flowing Streams (April 2001), $cBOD_u$ is equivalent to 2.5($cBOD_5$). So, this model output results in a calculated monthly average $cBOD_5$ limit of 16 mg/L. In accordance with 40 CFR 133, a multiplier of 1.5 is used to calculate the weekly average. So, $cBOD_5$ limits of 16 mg/L (540 g/d) monthly average and 24 mg/L (820 g/d) weekly average have been included in the permit. The DO has been lowered to 7.0 mg/L. These limits are more stringent than the Federal Effluent Guidelines' secondary treatment standards (40 CFR Part 133.102) of 30 mg/L monthly average and 45 mg/L weekly average for $cBOD_5$.

Discharge Data Input			Model Output		
Temp °C	BOD_u (mg/L)	DO (mg/L)	DO Sag (mg/L)	*$cBOD_5$ (mg/L)	DO Violation Predicted?
20	50	7.10	6.83	20	yes
20	42	7.10	6.98	17	yes
20	41	7.00	7.00	16	no

*$cBOD_5$= BOD_u/2.5

Grab sampling for $cBOD_5$ shall continue to be conducted once per discharge week during the short operational season. There is a startup period each year and more frequent monitoring is needed to characterize the system. In addition, the facility is to meet a minimum technology based requirement for 85 percent removal efficiency for $cBOD_5$. DO shall continue to be monitored once per discharge day.

Since the latest operational improvements to the treatment facility prior to May 2011, the maximum monthly average $cBOD_5$ was 11 mg/L (May 2012) and the maximum weekly average $cBOD_5$ was 22 mg/L (May 2012). Since 2011, the $cBOD_5$ concentration values appear to be well within the new more stringent $cBOD_5$ limits. During the 2012 operational season all of the DO values were above the 7.0 mg/L limit. Given previous operational performance, these revised $cBOD_5$ and DO limits appear to within the capabilities of the current treatment facility under most normal conditions. Therefore, a compliance schedule to meet the new limit is not needed.

Total Suspended Solids (TSS) – During the 2008 through 2012 operational seasons, there were no exceedances of the TSS limits. TSS limits are technology-based requirements for municipal dischargers of secondary treatment required in accordance with 40 CFR Part 133. These limits of 30 mg/L (1000 g/d) monthly average and 45 mg/L (1500 g/d) weekly average are the same as the previous permit. Grab samples shall continue to be collected once per discharge month.

E. coli – The application included 3 samples collected for *E. coli*, and the data were between 13.1 MPN/100 mL and 109.5 MPN/100 mL. These values appear to demonstrate adequate disinfection. A bacteria water quality demonstration project was completed in 2004. Twelve data points were collected for effluent E. coli and total residual chlorine (contact tank). The results of this study demonstrated compliance with the Water Quality Standard through chlorine disinfection. Since the permit contains chlorine disinfection limits and bacteria monitoring data were low, *E. coli* monitoring or limits are not needed when chlorine disinfection is used.

In the event the facility uses ultraviolet disinfection, *E. coli* limits and weekly monitoring have been continued from the previous permit. The definition of geometric mean given in the Water Quality Standards, 9 VAC 25-260-170 has recently been revised to indicate that the geometric mean "shall be calculated using all data collected during any calendar

month with a minimum of four weekly samples. If there are insufficient data to calculate a monthly geometric mean..., no more than 10% of the total samples in the assessment period shall exceed 235 cfu/100 mL for *E. coli.* " The geometric mean of 126 cfu/100 mL applies if four or more samples are collected. In the event that fewer than four samples are collected, only the maximum daily limit of 235 cfu/100 mL applies.

C. **Effluent Limitations for Toxic Pollutants**

Total Residual Chlorine (TRC) – Since the discharge is into an intermittent stream, the wasteload allocations are equivalent to the water quality criteria. Based on the WLAs and the Agency's STATS program output, the permit limits of 0.007 mg/L monthly average and 0.009 mg/L weekly average have been continued from the previous permit. See **Attachment F** for the WLA spreadsheet and STATS program output. Monitoring shall continue to be via grab samples once per discharge day.

Ammonia as Nitrogen – There were exceedances of the ammonia limits during July 2009, August 2009, and June 2012 (**Attachment F**). The ammonia limits of 1.8 mg/L monthly average and 1.8 mg/L weekly average have been continued from the 1993 permit reissuance. These limits have been based upon water quality criteria prior to revisions to the Water Quality Standards (9 VAC 25-260-00 et seq.) on December 10, 1997. The old limits were more conservative (lower) than a limit that would be calculated for ammonia using the current standard because the current averaging period for the chronic criterion has changed from 4 days to 30 days. The 90th percentile pH and temperature values used in the 1993 wasteload allocation spreadsheet to calculate the original limits were higher than the current values. The current wasteload allocations are higher than the wasteload allocations used to calculate the original limit. So, the resulting limits are sufficiently stringent and there is no need to rerun the STATS program to verify the limits. The limits have been continued in the reissuance because backsliding on a limit due to a change in the water quality standards regulation is not allowed by the VPDES permit regulations. A copy of the WLAs and STATS program output from the 1993 reissuance has been included in **Attachment F**.

17. **Basis for Sludge Use and Disposal Requirements:** Since the facility proposes to pump and haul sludge to a POTW, there are no limits or monitoring requirements associated with sludge use or disposal beyond compliance with the Sludge Management Plan approved with the reissuance of the permit.

18. **Antibacksliding Statement:** The minimum dissolved oxygen (DO) limit has decreased from the previous permit term. The $cBOD_5$ limit has been reduced to compensate for this lower DO limit. The model output from the DO limit does not reduce the dissolved oxygen in the receiving stream. There are no other limitations less stringent than the previous permit. Therefore, the permit limits comply with the antibacksliding requirements of 9 VAC 25-31-220 L of the VPDES Permit Regulation.

19. **Compliance Schedules:** There are no compliance schedules included in this permit.

20. **Special Conditions:** A brief rationale for each special condition contained in the permit is given below.

A. **Additional Total Residual Chlorine (TRC) Limitations and Monitoring Requirements (Part I.B)**

Rationale: This condition requires that the permittee monitor the TRC concentration after chlorine contact. In accordance with 40 CFR 122.41 (e), the permittee is required, at all times, to properly operate and maintain all facilities and systems of treatment in order to comply with the permit. These requirements ensure proper operation of chlorination equipment to maintain adequate disinfection.

B. **Compliance Reporting (Part I.C.1)**

Rationale: In accordance with VPDES Permit Regulation, 9 VAC 25-31-190 J4 and 220 I, DEQ is authorized to establish monitoring methods and procedures to compile and analyze data on water quality, as per 40 CFR Part 130, Water Quality Planning and Management, Subpart 130.4. This condition is necessary when toxic pollutants are monitored by the permittee and a maximum level of quantification and/or specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. This condition also establishes protocols for calculation of reported values.

C. **95% Capacity Reopener (Part I.C.2)**

Rationale: This condition requires that the permittee address problems resulting from high influent flows, in a timely fashion, to avoid non-compliance and water quality problems from plant overloading. This requirement is contained in 9 VAC 25-31-200 B2 of the VPDES Permit Regulations.

D. **CTC, CTO Requirement (Part I.C.3)**

Rationale: This condition is required by Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790.

E. **Operations and Maintenance Manual Requirement (Part I.C.4)**

Rationale: An Operations and Maintenance Manual is required by the Code of Virginia § 62.1-44.19; the Sewage Collection and Treatment Regulations, 9 VAC 25-790; and the VPDES Permit Regulation, 9 VAC 25-31-190 E.

F. **Licensed Operator Requirement (Part I.C.5)**

Rationale: The VPDES Permit Regulation, 9 VAC 25-200 D and the Code of Virginia §54.1-2300 et seq., Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.), require licensure of operators.

G. **Reliability Class (Part I.C.6)**

Rationale: A Reliability Class I has been assigned to this facility. Reliability class designations are required by Sewage Collection and Treatment Regulations, 9 VAC 25-790-70 for all municipal facilities.

H. **Sludge Reopener (Part I.C.7)**

Rationale: This condition is required by VPDES Permit Regulation, 9 VAC 25-31-220 C4 for all permits issued to treatment works treating domestic sewage.

I. **Sludge Use and Disposal (Part I.C.8)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-100 P; 220 B2; and 420 and 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal. Technical requirements may be derived from the VPA Permit Regulations, 9 VAC 5-32-10 et seq. This special condition, in accordance with Guidance Memo No. 97-004, clarifies that the Sludge Management Plan approved with the reissuance of this permit is an enforceable condition of the permit.

J. **Total Maximum Daily Load (TMDL) Reopener (Part I.C.9)**

Rationale: Section 303(d) of the Clean Water Act requires that Total Maximum Daily Loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to Section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

K. **Treatment Works Closure Plan (Part I.C.10)**

Rationale: In accordance with State Water Control Law § 62.1-44.19, this condition is used to notify the owner of the need for a closure plan where a treatment works is being replaced or is expected to close.

L. **Permit Application Requirement (Part I.C.11)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-100.D and 40 CFR 122.21(d)(1) require submission of a new application at least 180 days prior to expiration of the existing permit. In addition, the VPDES Permit Regulation, 9 VAC 25-31-100 E.1 and 40 CFR 122.21 (e)(1) note that a permit shall not be issued before receiving a complete application.

M. **Conditions Applicable to All VPDES Permits (Part II)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

21. **Changes to the Permit:**

A. **Special conditions that have been modified from the previous permit are listed below: (The referenced permit sections are for the new permit.)**

1. The Additional Total Residual Chlorine (TRC) Limitations and Monitoring Requirements Special Condition (Part I.B) has been revised to reflect changes in the Water Quality Standards.

2. The Operations and Maintenance Manual Special Condition (Part I.C.4) has been revised in accordance with the VPDES Permit Manual.

3. A Compliance Reporting Special Condition (Part I.C.1) has been revised to include information about significant figures.

B. **A new special condition that has been added to the permit is listed below:**

A Permit Application Requirement Special Condition (Part I.C.11) has been added to provide the specific due date for the required submittal of the application.

C. **Permit Limits and Monitoring Requirements:** See Table III on page 17 for details on changes to the effluent limits and monitoring requirements.

22. **Variances/Alternate Limits or Conditions:** No variances or alternate limits or conditions are included in this permit. For the application, the permittee requested a waiver to allow the submission of *E. coli* data in lieu of fecal coliform data. The permittee also requested that the grab analysis data for TSS and BOD_5 collected during the permit term be used in the application in lieu of composite samples. These waivers were consistent with current permit requirements, and therefore they were granted.

In conjunction with the reissuance application, the permittee submitted a letter, dated January 14, 2013, requesting that PCB monitoring not be required. The permittee noted that PCB waste is

not generated at the facility and there are no PCB materials currently stored onsite. The discharge from Mountain Lake Biological Research Station WWTP is located in the watershed TMDL study area, but a PCB TMDL allocation is not expected because this facility is not believed to contribute to PCB contamination in the watershed. Therefore, the reissuance permit will not require PCB monitoring.

23. **Regulation of Treatment Works Users:** The VPDES Permit Regulation, 9 VAC 25-31-280 B9, requires that every permit issued to a treatment works owned by a person other than a state or municipality provide an explanation of the Board's decision on the regulation or users. The state of Virginia through University of Virginia, owns this treatment works; therefore this regulation does not apply.

24. **Public Notice Information required by 9 VAC 25-31-290 D:**

All pertinent information is on file and may be inspected, and arrangements made for copying by contacting Becky L. France at:

Virginia DEQ
Blue Ridge Regional Office
3019 Peters Creek Road
Roanoke, VA 24019
540-562-6700
becky.france@deq.virginia.gov

Persons may comment in writing or by e-mail to the DEQ on the proposed permit action and may request a public hearing during the comment period. Comments shall include the name, address, and telephone number of the writer and of all persons represented by the commenter/requester, and shall contain a complete, concise statement of the factual basis for the comments. Only those comments received within this period will be considered.

The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state (1) the reason why a hearing is requested; (2) a brief informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and (3) specific references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may review the draft permit and application at the Blue Ridge Regional Office in Roanoke by appointment. A copy of the public notice is found in **Attachment H**.

25. **303(d) Listed Segments (TMDL):** This facility discharges to an unnamed tributary of Hunters Branch. This stream segment receiving the effluent is not listed on the current 303(d) list.

A segment of the New River from the I-77 bridge to the VA/WVA state line (including Peak Creek and Reed Creek) has been classified as impaired due to PCBs in fish tissues. A PCB TMDL will be prepared for the watersheds which include Stony Creek (**Attachment E**). In conjunction with the reissuance application, the permittee submitted a letter, dated January 14, 2013, requesting that PCB monitoring not be required. The permittee noted that PCB waste is not generated at the facility and there are no PCB materials currently stored onsite. The discharge from Mountain Lake Biological Research Station WWTP is located in the watershed TMDL study area, but a PCB TMDL allocation is not expected because this facility is not believed to contribute to PCB contamination in the watershed. Therefore, the reissuance permit will not require PCB monitoring.

26. **Additional Comments:**

A. **Reduced Effluent Monitoring:** Guidance Memo 98-2005 allows for reduced monitoring at facilities with excellent compliance histories. To qualify for consideration of reduced monitoring, the facility should not have been issued any Letter of Noncompliance (LON), Notice of Violation (NOV), or Warning Letter, or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years.

The facility received a received warning letters and a NOV as follows:

Warning Letters	
W2012-08-W-1006	significant ammonia exceedances in June 2012
W2011-11-W-1003	dissolved oxygen significantly below minimum limit in June 2011
W2011-08-W-1006	dissolved oxygen significantly below minimum limit in June 2011
NOV	
W2009-10-W-003	chlorine below minimum limit in May dissolved oxygen significantly below minimum limit in June 2009 significant ammonia exceedances in June, July, and August 2009

In accordance with Guidance Memo 98-2005, the facility is not considered eligible for reduced monitoring evaluation. Also, this facility only operates two and a half months out of the year, so reduction in monitoring frequency may not be applicable.

B. **Previous Board Action:** None

C. **Staff Comments:** The discharge is not controversial. The discharge is not addressed in any planning document, but will be included if applicable when the plan is updated.

D. **Public Comments:** No comments were received during the public comment period.

E. **Tables**

Table I	Discharge Description (Page 2)
Table II	Basis for Monitoring Requirements (Page 16)
Table III	Permit Processing Change Sheet (Page 17)

F. **Attachments**

A. Flow Frequency Memorandum
B. Wastewater Schematic
C. Site Inspection Report
D. USGS Topographic Map
E. Ambient Water Quality Information
- STORET Data (Station 9-LRY000.28)
- 2010 Impaired Waters Summary Sheet (Excerpt)
- 1997 Benthic Survey (Hunters Branch, UT)
- Endangered Species Review Information

F. Wasteload and Limit Calculations
- Mixing Zone Calculations (MIXER 2.1)
- Effluent Data
- Wasteload Allocation Spreadsheet
- Antidegradation Wasteload Allocation Spreadsheet
- STATS Program Results (Ammonia, TRC)

G. Water Quality Model Calculations
H. Public Notice
I. EPA Checksheet

Table II
BASIS FOR LIMITATIONS – MUNICIPAL

( ) Interim Limitations
(x) Final Limitations

OUTFALL: 001
DESIGN CAPACITY: 0.009 MGD

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	1/D-Day	Estimate
pH (Standard Units)	1,2	NA	NA	6.0	8.2	1/D-Day	Grab
$cBOD_5$	4	16 mg/L 540 g/d	24 mg/L 820 g/d	NA	NA	1/D-Week	Grab
Total Suspended Solids	1	30 mg/L 1000 g/d	45 mg/L 1500 g/d	NA	NA	1/D-Month	Grab
Dissolved Oxygen	3,4	NA	NA	7.0 mg/L	NA	1/D-Day	Grab
Total Residual Chlorine	3	0.007 mg/L	0.009 mg/L	NA	NA	1/D-Day	Grab
Ammonia as Nitrogen	3	1.8 mg/L	1.8 mg/L	NA	NA	1/D-Month	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the limitations codes are:
1. Federal Technology-Based Secondary Treatment Regulation (40 CFR Part 133)
2. Best Professional Judgment
3. Water Quality Criteria
4. Water Quality Model

Table III
PERMIT PROCESSING CHANGE SHEET

LIMITS AND MONITORING SCHEDULE:

Outfall No.	Parameter Changed	Monitoring Requirement Changed		Effluent Limits Changed		Reason for Change	Date
		From	To	From	To		
001	$cBOD_5$			20 mg/L (0.68 kg/d) monthly average; 30 mg/L (1.0 kg/d) weekly average	16 mg/L (540 g/d) monthly average; 24 mg/L (820 g/d) weekly average	Streeter-Phelps model calculations were rerun with new temperature data and modified inputs. The model output indicated that lower $cBOD_5$ limits are needed to prevent a dissolved oxygen decline below the trout stream water quality standard of 7.0 mg/L of dissolved oxygen.	11/30/12
001	Dissolved Oxygen			7.1 mg/L minimum daily	7.0 mg/L minimum daily	Streeter-Phelps model calculations were rerun with new temperature data and modified inputs. The model output indicated that lower $cBOD_5$ limits are needed to prevent a dissolved oxygen decline below the trout stream water quality standard of 7.0 mg/L of dissolved oxygen. With a reduced $cBOD_5$, the dissolved oxygen limit can be slightly lowered. Backsliding for dissolved oxygen is allowed because the same level of water quality protection is being provided due to the lower $cBOD_5$ limit.	11/30/12

Attachment A

Flow Frequency Memorandum

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
3019 Peters Creek Road, Roanoke, Virginia 24017

SUBJECT: Flow Frequency Determination
Mountain Lake Biological Research Station WWTP – Reissuance (VA0075361)

TO: Permit File

FROM: Becky L. France, Water Permit Writer BLF

DATE: November 29, 2012

Mountain Lake Biological Station discharges to an unnamed tributary of Hunter Branch near Mountain Lake, Virginia. Stream flow frequencies are required at this site to develop effluent limitations for the VPDES permit.

At the discharge point, the receiving stream is shown to be a dry ravine on the USGS Eggleston Quadrangle topographic map. The dry ravine drains to an intermittent stream. The flow frequencies for intermittent streams are 0.0 cfs for 1Q10, 7Q10, 30Q5, high flow 1Q10, high flow 7Q10, and the harmonic mean.

For determination of antidegradation baseline, flow frequencies are also needed for the Pond Drain above the confluence with Hunters Branch. They were estimated using the USGS continuous record gauge on Wolf Creek near Narrows, Virginia (#03175500) that has operated since 1908. The gauge is located at the Route 724 bridge in Giles County, Virginia. The values at the perennial point were determined by drainage area proportions and do not address any other discharges, withdrawals, or springs lying upstream. The high flow months are January through May. Flow frequencies for the perennial section are given on the attached table.

Flow Frequency Determination: Mountain Lake Biological Research Station WWTP

Reference Gauge (data from 1908 -1916, 1938-2003)
Wolf Creek at Roanoke, VA (#03175500)
Drainage Area [mi^2] = 223

	ft^3/s	MGD		ft^3/s	MGD
1Q10 =	19.3	12	High Flow 1Q10 =	29	19
7Q10 =	22.0	14	High Flow 7Q10 =	36	23
30Q5 =	30.5	20	HM =	95	61
30Q10=	26.7	17	High Flow 3010=	60	39

Flow frequencies for the reissued permit (11/28/12)
Pond Drain above Hunters Branch
Drainage Area [mi^2] = 1.8

	ft^3/s	MGD		ft^3/s	MGD
1Q10 =	0.16	0.10	High Flow 1Q10 =	0.23	0.15
7Q10 =	0.18	0.11	High Flow 7Q10 =	0.29	0.19
30Q5 =	0.25	0.16	HM =	0.77	0.50
30Q10=	0.22	0.14	High Flow 30Q10=	0.48	0.31

Wolf Creek at Route 724 near Narrows, VA

SITEID	NAME	RECORD	DAAREA	HARMEAN	HF30Q10	HF7Q10	HF1Q10	Z30Q5	Z30Q10	Z7Q10	Z1Q10	Z1Q30	HFMTHS	STATPERIOD	YRSTRN	NOTES
03175500	Wolf Creek at Narrows, Va.	R, 1908-1916, 1938-	223	95	60	36	29	30.5	26.7	22	19.3	13	DEC-MAY	1908-1916, 1938-2003	2012	1996 Water Year is not a complete year

France, Becky (DEQ)

From: Sitler, Jeffrey (js2zf) [js2zf@eservices.virginia.edu]
Sent: Thursday, December 13, 2012 11:18 AM
To: France, Becky (DEQ)
Subject: Mountain Lake

Becky,
Here is a photograph of the discharge end of the Mountain Lake treatment plant to help answer your questions. The plant discharges directly into a drainage channel right at the plant. This channel/intermittent steam flows approximately 600 hundred feet before leaving the property. From there it is another approximate 600 feet to Hunters Branch.

Figure 1. End of treatment system and channel into which our effluent is discharged. The channel flows several hundred feet before leaving the property. The fence is security for the plant only. May 7, 2012

I hope this helps. Let me know if you have any questions.

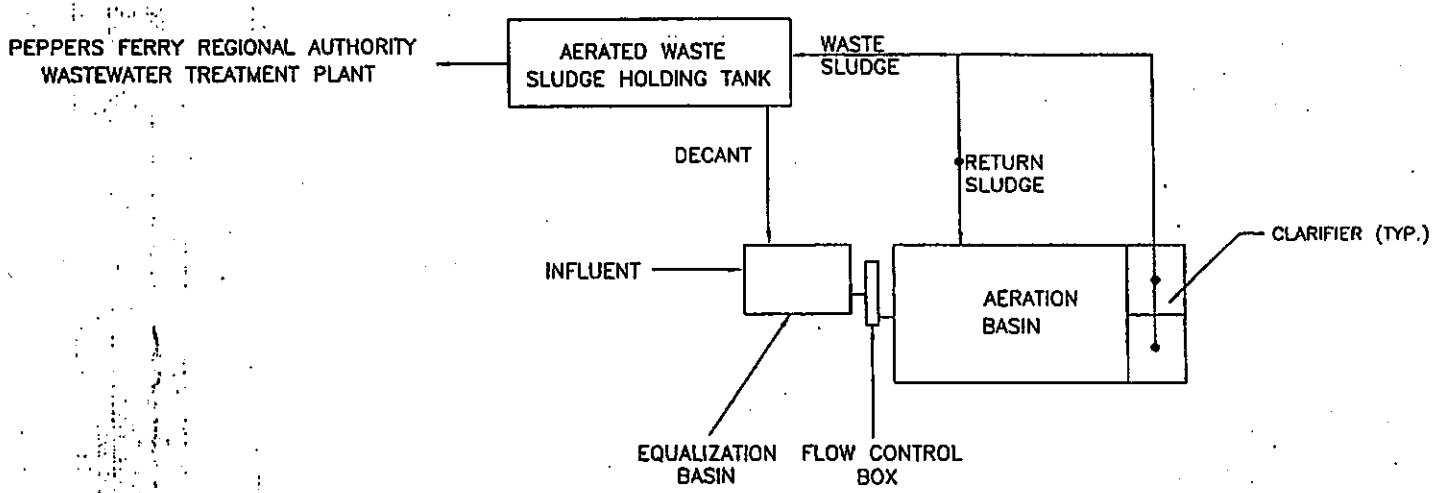
Thank you.

Jeff

Jeffrey A. Sitler, CPG
Director of Environmental Compliance Programs
Hydrogeologist

Attachment B

Wastewater Schematic



MOUNTAIN LAKE BIOLOGICAL RESEARCH STATION WASTEWATER TREATMENT PLANT
SLUDGE PROCESSES

FIGURE 2

ANDERSON AND ASSOCIATES, Inc.
Engineers
Surveyors
Planners
Blacksburg, VA
Greensboro, NC
Middletown, VA
Richmond, VA
Tri-Cities, TN

DRAWN	SCALE	DATE	DOCUMENT NO.
LMP	N.T.S.	31 DEC 01	18202-031

Attachment C

Site Inspection Report

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Site Inspection Report for Mountain Lake Biological Station
Reissuance of VPDES Permit No. VA0078361

TO: Permit File

FROM: Becky L. France, Environmental Engineer Senior

DATE: August 2, 2011

On July 29, 2011, a site inspection was conducted of the wastewater works for Mountain Lake Biological Station. Brian White, operator for the extended aeration facility, was present at the inspection. Mountain Lake Biological Station is located at the end of State Road 668 in Giles County, Virginia. There is one drinking water well onsite that serves the research facilities and residences.

Familiarization with Plant Operations

Mountain Lake Biological Station operates seasonally from approximately June to mid-August each year. Wastewater from the teaching facility, dining hall, residential cottages, and caretaker's cottage is treated by an extended aeration package plant system that operates during this same period. At the time of the site visit the treatment facility was serving a population of approximately 67 people. Due to the seasonal nature of the station, the wastewater treatment system is pumped and shut down each year. The small amount of wastewater generated from the reduced nonseasonal flow is handled by a septic system with a drainfield.

The extended aeration system consists of a bar screen, equalization basin with aerator unit, aeration basin with three air diffusers, sludge holding tank with aerator unit, two clarifiers, tablet chlorinator with baffled chlorine contact chamber, dechlorinator, and post aeration tank with aerator. A baffled grease trap is designed to handle grease from the dining hall.

During the 2009 operational season, the permittee had exceedances of the effluent limits for dissolved oxygen, total residual chlorine, pH, and ammonia. In response to these operational problems, some modifications were completed prior to the 2011 operational season. To address flow variability, the influent weir was raised to allow the return valve to function properly to control flow to the equalization basin. To improve treatment, a soda ash feed system was installed to regulate pH (approximately 7.2 S.U.) and alkalinity. Also, the existing aeration basin blowers were replaced with timer-controlled, regenerative blowers to prevent over oxidation. Some piping that discharges wastewater into the clarifiers was removed to reduce turbulence. The sprayer unit was modified to provide better foam control.

According to Mr. White, the plant received seed sludge from Pembroke WWTP at the beginning of the 2011 operational season. During the site visit, no foam or froth was observed in the aeration basin. The activated sludge was a light chocolate color. Wastewater from the activated sludge basin flows into the clarifier. The clarifier tank has one hopper with an air pump for sludge return. Any excess sludge is pumped to an aerated sludge holding basin. This sludge basin is pumped periodically as needed, and the sludge is transported by a contract waste hauler to a conventional wastewater treatment plant. According to Mr. White, improvements to the sludge holding area include replacing the sludge decant/transfer value and the waste sludge control valve and resealing the area between the sludge holding tank vault section to prevent ground water infiltration. At the time of the site visit, the sludge was settling well. Solids did not seem to be carried over the clarifier weir.

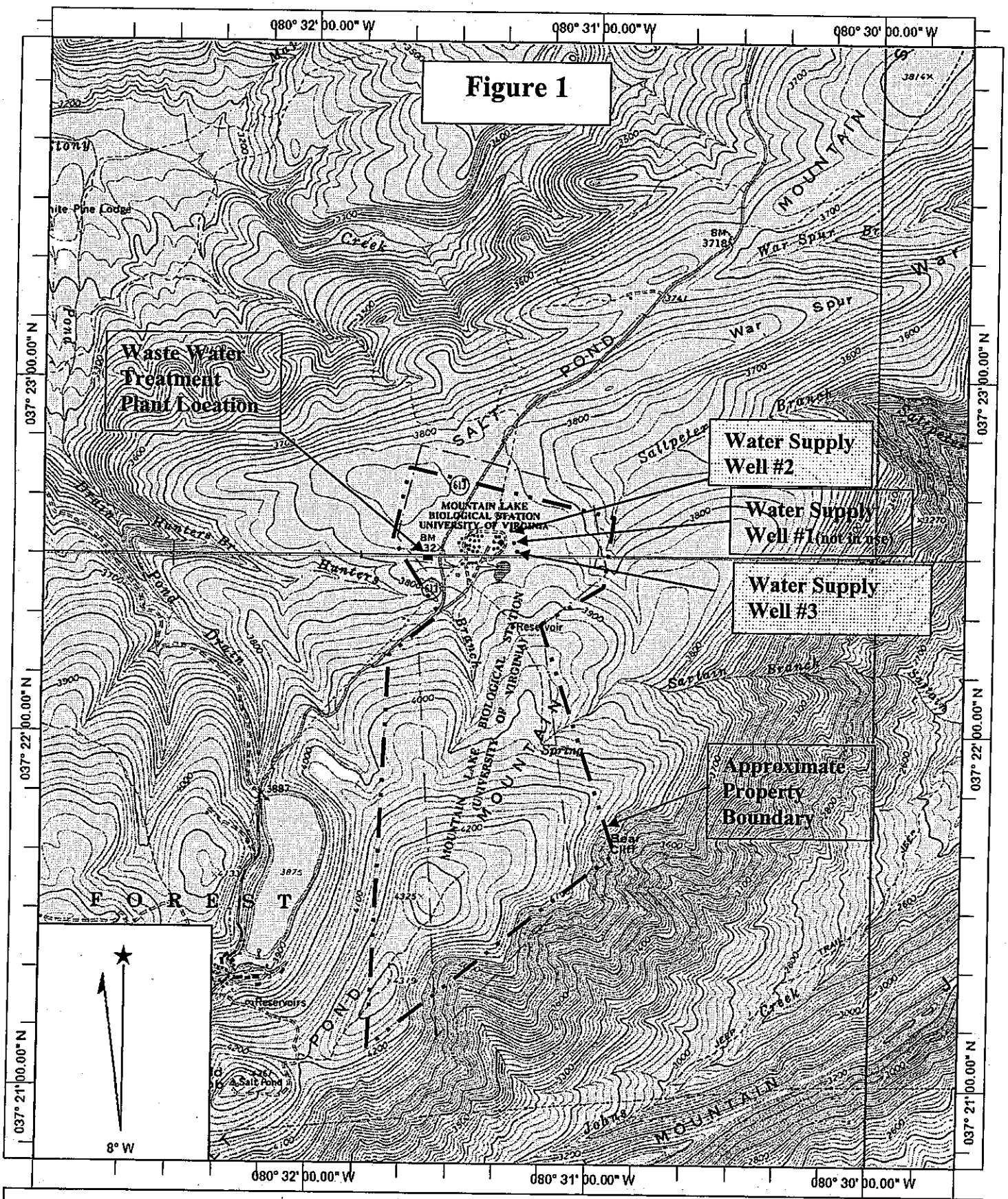
The wastewater from the extended aeration system flows to the disinfection system, which includes a tablet chlorinator, baffled chlorine contact chamber, and a tablet dechlorinator. At the time of the site visit, one tube with calcium hypochlorite tablets was being used for disinfection and two tubes with sodium sulfite tablets were being used for dechlorination. Disinfected effluent flows into a post aeration tank which contains three flexible fine bubble membrane tube diffusers. Effluent flow is measured with an ultrasonic flow measurement device.

Location of Discharge/ Description of Receiving Waters/ Stream Uses

Effluent is discharged from a 12-inch PVC pipe into a ravine to Hunters Branch. The shallow, arc shaped stream bed has a silty bottom. Hunters Branch feeds into Pond Drain which flows into Little Stony Creek. This area is a wildlife preserve, and there are no other dischargers in the vicinity. The area is used primarily for recreation and as a wildlife research station. The discharge flows into tributaries that drain into Little Stony Creek which is a stockable trout stream. Jefferson National Forest and Cascades Recreational Area are located downstream of this discharge point.

Attachment D

USGS Topographic Map



Name:EGGLESTON Quadrangle
Date: 9/12/2007
Scale: 1 inch equals 2000 feet

Location: 037° 22' 22.26" N 080° 31' 19.23" W
Caption: Mountain Lake Biological Station

Attachment E

Ambient Water Quality Information

- **STORET Data (Station 9-LRY000.28)**
- **2010 Impaired Waters Summary Sheet (Excerpt)**
- **1997 Benthic Survey (Hunters Branch, UT)**
- **Endangered Species Review Information**

Watershed Code	Station ID
VAW-N24R	9-LRY000.28

Collection Date Time	Temp Celsius	Do Probe mg/L	Field pH S.U.	BOD, 5 DAY,mg/L	Nitrogen, Ammonia, total (mg/L as N)	Hardness, Total (mg/L as CACO3)	Fecal Coliform,Membr Filter,M-FC BROTH,44.5 C	E. Coli - MTEC-MF N0/100ml
08/01/1996 15:00	18.00	8.5	7.40			18.0	1200	
11/04/1996 14:30	9.00	8.2	8.50			18.0	<100	
02/03/1997 15:00	6.50	11.6	8.50			15.7	<100	
05/01/1997 15:00	24.40	8.7	8.60			21.1	<100	
11/03/1997 13:30	8.50	9	7.90	<2.0	<0.04	15.3	100	
02/09/1998 14:30	6.70	12.5	7.60	<2.0	<0.04	25.8	<100	
05/21/1998 15:30	17.60	9.1	8.00	<2.0	<0.04	25.6	400	
02/03/1999 15:00	7.70	11.1	7.80	3.000	<0.04	16.0	<100	
05/03/1999 15:30	13.00	9.4	8.60	<2.0	<0.04	10.0	<100	
07/13/1999 15:00	15.90	8.6	8.70	2.000	.080	19.5	1800	
11/09/1999 15:00	11.10	9.3	7.90	<2.0	<0.04	14.7	<100	
01/11/2000 15:00	6.40	10.2	8.20	<2.0	<0.04	10.0	<100	
03/07/2000 15:00	11.20	9.7	7.80	<2.0	<0.04	21.0	<100	
05/03/2000 15:00	14.20	9.9	7.70	<2.0	<0.04	16.0	<100	
07/25/2000 09:00	15.30	9.5	7.79	<2.0	<0.04	21.1	100	
09/26/2000 09:00	12.60	8.9	7.39	<2.0	<0.04	9.2	500	
11/20/2000 08:30	1.20	13.4	8.48	<2.0	<0.04	5.0	<100	
01/30/2001 10:50	4.90	12.6	7.81	<2.0	<0.04	9.0	<100	
03/15/2001 09:10	5.70	11.91	8.51	<2.0	<0.04	10.7	<100	
08/14/2003 10:10	17.06	9.41	7.65		<0.04			200
10/29/2003 16:30	10.13	9.34	7.62		<0.04			<25
12/16/2003 09:30	6.41	10.18	6.08		<0.04			<25
02/12/2004 10:00	2.70	12.24	7.44		<0.04			25
04/27/2004 09:25	9.87	9.4	7.73		<0.04			<25
06/15/2004 09:00	16.70	8.8	7.42		<0.04			75
10/26/2004 09:50	10.60	10.98	6.79		<0.04			<25
12/16/2004 09:55	1.03	13.47	7.93		<0.04			<25
02/15/2005 09:55	5.44		7.62		<0.04			<25
04/13/2005 09:50	8.40	11.03	7.58		<0.04			75
06/14/2005 09:30	16.50	9.6	7.50		<0.04			100

90th Percentile pH	8.52 S.U.
10th Percentile pH	7.40 S.U.
90th Percentile temp	17.1 °C
Mean Hardness	15.9 mg/L

2010 Impaired Waters

Categories 4 and 5 by DCR Watershed*

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

New River Basin

Fact Sheet prepared for DCR Watershed: N24*

Cause Group Code: **N29R-01-PCB** **New River, Claytor Lake, Peak Creek, Reed Creek and Stony Creek**

Location: The impairment begins at the I-77 bridge crossing the New River and extends downstream to the VA/WVA State Line and includes the tributaries Peak Creek and Reed Creek as described below.

City / County: Giles Co. Montgomery Co. Pulaski Co. Radford City

Use(s): Fish Consumption

Cause(s) / VA Category: PCB in Fish Tissue/ 5A

The Virginia Department of Health (VDH) issued a fish consumption advisory on August 6, 2001 for polychlorinated biphenyls (PCBs) for the lower portion of the New River (Rt. 114 Bridge downstream to the VA / WVA State Line - 52.0 miles) based on fish tissue collections from Carp. An Advisory extension to Claytor dam was issued 8/06/2003 (11.47 miles) recommends that no carp be consumed in these waters and no more than two meals per month of flathead and channel catfish. The VDH PCB Fish Consumption Advisory was further extended upstream on the New River (13 miles) to the I-77 Bridge to include the lower portions of Peak Creek (4.02 miles), Reed Creek (16.35 miles) and Claytor Lake (4,287 acres) on 12/02/2004. The VDH advises consumption should not exceed two meals per month for carp and smallmouth bass. The VDH level of concern is 50 parts per billion (ppb) in fish tissue.

There are eight fish tissue collection sites within the 2010 data window reporting exceedances of the WQS based 20 ppb fish tissue value (TV) (VDH 50 ppb). These data are reviewed by the VDH in making an advisory determination. A complete listing of collection sites and associated fish tissue data are available at http://www.deq.virginia.gov/fishtissue/fishtissue.html. A more detailed presentation of the data can also be found using an interactive mapping application at http://gisweb.deq.state.va.us/. The VDH Advisory information is also available via the web at http://www.vdh.virginia.gov/Epidemiology/PublicHealthToxicology/Advisories/.

9-SNC000.20- 2004 fish tissue finds with application of the new WQS TV for PCB (20 ppb) the addition of 3 species exceeding the new TV criterion. Rock Bass (size 16-20 cm) at 25.21, SM Bass (size 28.6-30.5 cm) at 22.13 and White sucker (1 fish) at 30.08 ppb. Stony Creek is therefore a 2010 addition based on the new WQS PCB tissue value of 20 ppb.

Assessment Unit / Water Name / Description	Cause	Category / Name	Nested	Cycle First Listed	TMDL Schedule or EPA Approval	Size
VAW-N24R_NEW01A00 / New River / New River mainstem from the confluence of Stony Creek upstream to the mouth of Walker Creek on the New River.	5A	PCB in Fish Tissue		2002	2014	3.82
VAW-N24R_NEW02A00 / New River / New River mainstem waters from the mouth of Walker Creek upstream to the confluence of Little Stony Creek with the New River.	5A	PCB in Fish Tissue		2002	2014	1.96
VAW-N24R_NEW03A00 / New River / New River mainstem waters from the confluence of Little Stony Creek upstream to mouth of Sinking Creek on the New River.	5A	PCB in Fish Tissue		2002	2014	3.85

New River, Claytor Lake, Peak Creek, Reed Creek and Stony Creek **DCR Watershed: N24***	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
PCB in Fish Tissue - Total Impaired Size by Water Type:			**9.63**

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

2010 Impaired Waters

Categories 4 and 5 by DCR Watershed*

New River Basin

Fact Sheet prepared for DCR Watershed: N24*

Sources:

Source Unknown

*Header Information: Location, City/County, Cause/VA Category and Narratives; describe the entire extent of the Impairment. Sizes presented are for Assessment Units (AUs) lying within the DCR Watershed boundary noted above.

M E M O R A N D U M

DEPARTMENT OF ENVIRONMENTAL QUALITY

WEST CENTRAL REGIONAL OFFICE

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: PC NO. 97-0610 ____ INITIAL REPORT X COMPLETION REPORT

TO: WCRO POLLUTION COMPLAINT FILE

FROM: L. D. WILLIS, Ph.D.

DATE: September 23, 1997

COPIES: JIM SMITH, JIM SCOTT

THE FOLLOWING TEXT IS TO DOCUMENT A VISUAL INSPECTION OF THE MT. LAKE BIOLOGICAL STATION STP, GILES CO., VA. THE INITIAL INVESTIGATION WAS CONDUCTED JANUARY, 1997, BY L. D. WILLIS AND A BENTHIC SURVEY WAS CONDUCTED BY JON ZALEWSKI AND CHARLENE WAYBRIGHT, DEQ, WCRO ON JULY 7, 1997.

THE JANUARY INSPECTION REVEALED A DISCHARGE COMING FROM THE STP PIPE DURING A PERIOD WHEN THE PLANT IS SUPPOSED TO BE SHUT DOWN. FURTHER INVESTIGATION INDICATED A SPRING WAS FLOWING AROUND AND INTO THE TREATMENT WORKS AND FLOWING OUT THE DISCHARGE PIPE. THIS IS A PRBLEM BECAUSE THE EFFLUENT IS BEING DILUTED BEFORE DISCHARGE AND THE SEWAGE CAN RUN OUT OF THE PLANT THE SAME WAY AND CONTAMINTED THE SOIL AROUND THE PLANT.

THE JANUARY STREAM SURVEY WAS CALLED OFF BECAUSE OF INDICATIONS THAT THE STREAM HAD RECENTLY FROZEN WITH ANCHOR ICE WHICH COULD HAVE CAUSED IMPAIRMENT TO THE STREAM. ALSO, BECAUSE THE DISCHARGE WAS DETERMINED TO BE SPRING WATER THE SURVEY WAS NOT NEEDED AT THAT TIME. THE JULY SURVEY WAS DURING PEAK DISCHARGE FROM THE PLANT. MY INTERPRETATION OF THE DATA IS THAT NO MEASUREABLE ENVIRONMENTAL IMPAIRMENT IS OBSERVED. THE DOMINANT TAXA IS CHLOROPERLIDAE STONEFLIES WHICH ARE VERY POLLUTION SENSITIVE. DIVERSITY IS LOW IN BOTH THE CONTROL AND TEST STATIONS WHICH IS EXPECTED IN SMALL, HEADWATER, MOUNTAIN STREAMS.

ACTION TAKEN OR STAFF RECOMMENDATIONS

I RECOMMEND THAT THE FACILITY DIVERT TTHE SPRING WATER FROM ENTERING THE TREATMENT WORKS.

Field Collection Data Sheet

Sample Identification

Stream:
Date: 7/17/97
Observer: Murphy/Walkowski

Location: 50yrds downstream from plant
Time: 12:00

River Mile:
Method:

Monitoring Station Information

Region:
Latitude
HUC:

Basin:
Longitude:
WBS Segment:

County:
USGS Quad Map:
DCR Watershed:

Eco-region:
Sub eco-region:
Land Use:

Chemical & Physical Water Conditions

Dissolved Oxygen: 8.50 pH: 7.29 Water Temperature: 17.1

Conductivity: 47.3 Salinity: _____ Residual Chlorine: _____

Habitat Characteristics 11+5+17+5+19+13+5+16+10+15+20+20

Average Width (meters): _____ Average Depth (centimeters): _____

Color: _____ Turbidity: _____ Odor: _____

Taxa Collected:

Fresh Water Sponges	Spongillidae		Heptageniidae 3		Hydroptilidae
Flatworms	Dendrocoelidae		Leptophlebiidae 23		Lepidostomatidae
	Planariidae		Neoephemeridae		Leptoceridae
Limpets	Ancylidae		Oligoneuriidae		Limnephilidae
			Polymitarcyidae		Molannidae
Non Operculate Snail	Lymnaeidae		Potamanthidae		Odontoceridae
	Physidae		Siphlonuridae		Philopotamidae
	Planorbidae	Odonata - Zygoptera	Tricorythidae		Phryganidae
			Calopterygidae		Polycentropodidae
Operculate Snails	Hydrobiidae		Coenagrionidae		Psycomyiidae
	Pleuroceridae		Lestidae		Rhyacophilidae 1
	Viviparidae		Protoneuridae		Sericostomatidae
		Odonata - Anisoptera		Lepidoptera	Pyralidae
Unionida	Corbiculidae		Aeshnidae		
	Sphaeriidae		Corduligastridae	Coleoptera	Chrysomelidae
	Unionidae		Cordulidae		Curculionidae
			Gomphidae		Dryopidae
Lumbriculida	Lumbriculidae		Libellulidae		Dytiscidae
			Macromiidae		Elmidae
Tubificida	Enchytraeidae		Petaluridae		Gyrinidae
	Naididae	Plecoptera			Haliplidae
	Tubificidae		Capniidae		Helodidae
			Chloroperlidae 47		Hydrophilidae
Haplotaxida	Haplotaxidae		Leuctridae		Limnichidae
			Nemouridae		Noteridae
Leeches	Erpodellidae		Peltoperlidae		Psephenidae
	Glossiphonidae		Perlidae		Ptilodactylidae
	Hirudinidae		Perlodidae		
	Piscicolidae		Pteronarcidae	Diptera	Athericidae 4
			Taeniopterygidae		Blephariceridae
Brachiobdellida	Brachiobdellidae	Hemiptera			Canaceidae
			Belostomatidae		Ceratopogonidae
Decopoda - Crayfish	Cambaridae 1		Corixidae		Chaoboridae
			Gelastocoridae		Chironomidae (A) 4
Fresh Water Shrimp	Palaemonidae		Gerridae		Chironomidae (B) 1
			Hebridae 2		Culicidae
Isopoda	Asellidae		Hydrometridae		Dixidae
			Mesoveliidae		Dolichopodidae
Amphipoda	Gammaridae		Naucoridae		Empididae
	Talitridae		Nepidae		Ephydridae
			Notonectidae		Muscidae
Hydracarina	Atractideidae		Veliidae		Psycodidae
	Diplodontidae	Neurotera			Ptychopteridae
	Hydrachnidae		Sisyridae		Sciomyzidae
	Lebertiidae	Megaloptera			Simulidae 1
	Sperchonidae		Corydalidae		Stratiomyidae
			Sialidae		Syrphidae
Ephemeroptera	Baetidae	Tricoptera			Tabanidae
	Baetiscidae		Brachycentridae		Tanyderidae
	Caenidae		Calamoceratidae		Tipulidae
	Ephemerellidae		Glossosomatidae		
	Ephemeridae		Helicopsychidae		
			Hydropsychidae 2		

eld Collection Data Sheet

Sample Identification

Control

Stream:
Date: 7/27/97
Observer: Wainwright/Zalewski

Location: Trib. to Hunter's Branch
Time: 12:00

River Mile:
Method:

Monitoring Station Information

Region:
Latitude
HUC:

Basin:
Longitude:
WBS Segment:

County:
USGS Quad Map:
DCR Watershed:

Eco-region:
Sub eco-region:
Land Use:

Chemical & Physical Water Conditions

Dissolved Oxygen: 8.92 pH: 6.34 Water Temperature: 19.0

Conductivity: 18.7 Salinity: _____ Residual Chlorine: _____

Habitat Characteristics 8+5+14+3+15+11+5+18+17+19+19+19

Average Width (meters): ~~1/3M~~ Average Depth (centimeters): 1.5cm

Color: _____ Turbidity: _____ Odor: _____

Taxa Collected:

Fresh Water Sponges	Spongillidae		Heptageniidae 1		Hydroptilidae
Flatworms	Dendrocoelidae		Leptophlebiidae		Lepidostomacidae
	Planariidae		Neoephemeridae		Leptoceridae
Limpets	Ancylidae		Oligoneuriidae		Limnophilidae
			Polymitarcyidae		Molannidae
Non Operculate Snail	Lymnaeidae		Potamanthidae		Odontoceridae
	Physidae		Siphlonuridae		Philopotamidae
	Planorbidae	Odonata - Zygoptera	Tricorythidae		Phryganidae
Operculate Snails	Hydrobiidae		Calopterygidae		Polycentropodidae
	Pleuroceridae		Coenagrionidae		Psycomyiidae
	Viviparidae		Lestcidae		Rhyacophilidae
		Odonata - Anisoptera	Protoneuridae		Sericostomatidae
Unionida	Corbiculidae		Aeshnidae	Lepidoptera	Pyralidae
	Sphaeriidae		Corduligastridae	Coleoptera	Chrysomelidae
	Unionidae		Corduliidae		Curculionidae
Lumbriculida	Lumbriculidae		Gomphidae		Dryopidae
			Libellulidae		Dytiscidae
Tubificida	Enchytraeidae		Macromiidae		Elmidae
	Naididae	Plecoptera	Petaluridae		Gyrinidae
	Tubificidae		Capniidae		Haliplidae
Haplotaxida	Haplotaxidae		Chloroperlidae 52		Helodidae
			Leuctridae		Hydrophilidae
Leeches	Erpodellidae		Nemouridae		Limnichidae
	Glossiphonidae		Peltoperlidae		Noteridae
	Hirudinidae		Perlidae		Psephenidae
	Piscicolidae		Perlodidae		Ptilodactylidae
			Pteronarcidae	Diptera	Athericidae 4
Branchiobdellida	Branchiobdellidae	Hemiptera	Taeniopterygidae		Blephariceridae
			Belostomatidae		Canaceidae
Decopoda - Crayfish	Cambaridae 2		Corixidae		Ceratopogonidae
			Gelastocoridae		Chaoboridae
Fresh Water Shrimp	Palaemonidae		Gerridae		Chironomidae (A)
			Hebridae 4		Chironomidae (B)
Isopoda	Asellidae		Hydrometridae		Culicidae
			Mesoveliidae		Dixidae
Amphipoda	Gammaridae		Naucoridae		Dolichopodidae
	Talitridae		Nepidae		Empididae
			Notonectidae		Ephydridae
Hydracarina	Atractideidae		Veliidae		Muscidae
	Diplodontidae	Neurotera	Sisyridae		Psycodidae
	Hydrachnidae				Ptychopteridae
	Lebertiidae	Megaloptera	Corydalidae		Sciomyzidae
	Sperchonidae		Sialidae		Simulidae 11
					Stratiomyidae
Ephemeroptera	Baetidae	Tricoptera	Brachycentridae		Syrphidae
	Baetiscidae		Calamoceriatidae		Tabanidae
	Caenidae		Glossosomatidae		Tanyderidae
	Ephemerellidae		Helicopsychidae		Tipulidae
	Ephemeridae		Hydropsychidae 22		

Field Collection Data Sheet

Sample Identification

Stream:
Date: 7/7/97
Observer: Wainwright + Zakowski
Location: 200 ft downstream from cent. of outfall + tr. 6
Time: 14:00
River Mile:
Method:

Monitoring Station Information

Region:
Basin:
County:
Latitude
Longitude:
USGS Quad Map:
HUC:
WBS Segment:
DCR Watershed:

Eco-region:
Sub eco-region:
Land Use:

Chemical & Physical Water Conditions

Dissolved Oxygen: 8.10
pH: 7.18
Water Temperature: 16.4
Conductivity: 48.1
Salinity: _____
Residual Chlorine: _____

Habitat Characteristics 15+10+16+13+20+13+11+10+10+8+20+20

Average Width (meters): _____
Average Depth (centimeters): _____
Color: _____
Turbidity: _____
Odor: _____

Taxa Collected:

Fresh Water Sponges
- Spongillidae

Flatworms
- Dendrocoelidae
- Planariidae

Limpets
- Ancylidae

Non Operculate Snail
- Lymnaeidae
- Physidae
- Planorbidae

Operculate Snails
- Hydrobiidae
- Pleuroceridae
- Viviparidae

Unionida
- Corbiculidae
- Sphaeriidae
- Unionidae

Lumbriculida
- Lumbriculidae

Tubificida
- Enchytraeidae
- Naididae
- Tubificidae

Haplotaxida
- Haplotaxidae

Leeches
- Erpodellidae
- Glossiphonidae
- Hirudinidae
- Piscicolidae

Brachiobdallida
- Brachiobdellidae

Decopoda - Crayfish
- Cambaridae

Fresh Water Shrimp
- Palaemonidae

Isopoda
- Asellidae

Amphipoda
- Grammaridae
- Talitridae

Hydracarina
- Atractideidae
- Diplodontidae
- Hydrachnidae
- Lebertiidae
- Sperchonidae

Ephemeroptera
- Baetidae
- Baetiscidae
- Caenidae
- Ephemerellidae
- Ephemeridae

Odonata - Zygoptera
- Calopterygidae
- Coenagrionidae
- Lestidae
- Protoneuridae

Odonata - Anisoptera
- Aeshnidae
- Corduligastridae
- Corduliidae
- Gomphidae
- Libellulidae
- Macromiidae
- Petaluridae

Plecoptera
- Capniidae
- Chloroperlidae 10
- Leuctridae
- Nemouridae
- Peltoperlidae
- Perlidae
- Perlodidae
- Pteronarcidae
- Taeniopterygidae

Hemiptera
- Belostomatidae
- Corixidae
- Gelastocoridae
- Gerridae
- Hebridae
- Hydrometridae
- Mesoveliidae
- Naucoridae
- Nepidae
- Notonectidae
- Veliidae

Neurotera
- Sisyridae

Megaloptera
- Corydalidae
- Sialidae

Tricoptera
- Brachycentridae
- Calamoceriatidae
- Glossosomatidae
- Helicopsychidae
- Hydropsychidae 4
- Heptageniidae 1
- Leptophlebiidae 10
- Neoephemeridae
- Oligoneuriidae
- Polymitarcyidae
- Potamanthidae
- Siphlonuridae 1
- Tricorythidae

Lepidoptera
- Pyralidae

Coleoptera
- Chrysomelidae
- Curculionidae
- Dryopidae
- Dytiscidae
- Elmidae
- Gyrinidae
- Haliplidae
- Helodidae
- Hydrophilidae
- Limnichidae
- Noteridae
- Psephenidae
- Ptilodactylidae

Diptera
- Athericidae 2
- Blephariceridae
- Canaceidae
- Ceratopogonidae
- Chaoboridae
- Chironomidae (A) 3
- Chironomidae (B)
- Culicidae
- Dixidae
- Dolichopodidae
- Empididae
- Sphydridae
- Muscidae
- Psycodidae
- Ptychopteridae
- Sciomyzidae
- Simulidae
- Stratiomyidae
- Syrphidae
- Tabanidae
- Tanyderidae
- Tipulidae
- Hydroptilidae
- Lepidostomatidae
- Leptoceridae
- Limnophilidae
- Molannidae
- Odontoceridae
- Philopotamidae 1
- Phryganidae
- Polycentropodidae
- Psycomyiidae
- Rhyacophilidae 1
- Sericostomatidae

Douglas W. Domenech
Secretary of Natural Resources

David A. Johnson
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

Division of Natural Heritage
217 Governor Street
Richmond, Virginia 23219-2010
(804) 786-7951

September 13, 2012

Becky France
DEQ-BRRO
3019 Peters Creek Road
Roanoke, VA 24019

Re: VA0075361, Mountain Lake Biological Station

Dear Ms. France:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

Biotics documents the presence of natural heritage resources in the project area. However, due to the scope of the activity and the distance to the resources, we do not anticipate that this project will adversely impact these natural heritage resources.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Gladys Cason (804-367-0909 or Gladys.Cason@dgif.virginia.gov). According to the information currently in our files, Johns Creek, which has been designated by the VDGIF as a "Threatened and Endangered Species Water", is within 2 miles of the project area. The species associated with this T & E Water are the James spinymussel (*Pleurobema collina*) and Atlantic pigtoe (*Fusconaia masoni*). Therefore, DCR recommends coordination with the United States Fish and Wildlife Service and VDGIF, Virginia's regulatory authority for the management and protection of this

or these species to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

Should you have any questions or concerns, feel free to contact me at 804-371-2708. Thank you for the opportunity to comment on this project.

Sincerely,

S. Rene' Hypes
Project Review Coordinator

CC: Ernie Aschenbach, VDGIF

France, Becky (DEQ)

From: Aschenbach, Ernie (DGIF)
Sent: Wednesday, September 26, 2012 10:59 AM
To: France, Becky (DEQ)
Cc: ProjectReview (DGIF); Cason, Gladys (DGIF); nhreview (DCR); Susan_Lingenfelser@fws.gov
Subject: ESSLog 25010; VPDES re-issuance DEQ# VA-0075361 for the seasonal (summer) discharge at Mountain Lake Biological Station WWTP in Giles County, VA

We have reviewed the above-referenced VPDES permit re-issuance for the seasonal (summer) discharge. According to the application, the treatment facility uses extended-aeration activated sludge plant treatment with dechlorination prior to its discharge with a capacity of 0.009 Million Gallons per Day (MGD). The receiving stream is an unnamed (intermittent) tributary to Hunter's Branch.

According to our records, Hunter's Branch is designated wild trout water containing brook trout. Hunter's Branch is a headwater stream to trout waters downstream of the discharge. We recommend the use of ultraviolet (UV) disinfection rather than chlorination disinfection. We support dechlorination, prior to discharge. Provided there are no changes to the effluent characteristics of the existing discharge, the permit limits are set using standards protective of wild trout waters, we do not anticipate the reissuance to result in adverse impact to designated wild trout waters or their associated species.

Johns Creek, a designated Threatened and Endangered (T&E) species waters for the federal Endangered state Endangered (FESE) James spinymussel, is known from the region. Johns Creek is in another drainage from the discharge; therefore, we do not anticipate the reissuance of this permit to result in adverse impact to this T&E species water or its associated species.

This project is located within 2 miles of a documented occurrence of a state or federal threatened or endangered plant or insect species and/or other Natural Heritage coordination species. Therefore, we recommend coordination with VDCR-DNH regarding the protection of these resources. We recommend contacting the USFWS regarding all federally listed species.

Thank you for the opportunity to provide comments.

Ernie Aschenbach
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
P.O. Box 11104
4010 West Broad Street
Richmond, VA 23230
Phone: (804) 367-2733
FAX: (804) 367-2427
Email: Ernie.Aschenbach@dgif.virginia.gov

France, Becky (DEQ)

From: Margaret_Byrne@fws.gov
Sent: Monday, October 22, 2012 2:26 PM
To: France, Becky (DEQ)
Subject: Permit Number: VA0075361 Mountain Lake Biological Station
Attachments: DMR Data Lookup Mountain Lake Biological Station 2012.xls; July 2012 DMR MLBS.pdf; June 2012 DMR MLBS.pdf; May 2012 DMR MLBS.pdf

Dear Ms. France,

We have reviewed the above referenced project description. The following comments are provided under provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended, and the Clean Water Act (33 U.S.C. 1251-1375, 86 Stat. 816).

Based on the project description and location, it appears that no impacts to federally listed species or designated critical habitat will occur, and we have no further comment. Should project plans change or if additional information on the distribution of listed species or critical habitat becomes available, this determination may be reconsidered. If you have any questions, please contact me at the contact information below or Susan Lingenfelser at (804) 693-6694, extension 151, or via email at susan_lingenfelser@fws.gov.

Sincerely,
Margaret Byrne

Margaret Byrne, MS, MPPA
Environmental Contaminants Information Specialist
U.S. Fish and Wildlife Service, Northeast Region
300 Westgate Center Dr., Hadley, MA 01035
Office: 413-253-8593
Cell: 612-599-4252

"France, Becky (DEQ)" <Becky.France@deq.virginia.gov>

08/24/2012 12:18 PM

To **"Margaret_Byrne@fws.gov" <Margaret_Byrne@fws.gov>,**
cc
Subject **RE: Request for information for Endangered Species Review Request**

I have attached for Mountain Lake Biological Station Discharge Monitoring Report (DMR) data. The DMR data through 2011 have been added to our electronic database system. The due dates are for the previous month's data. So, January 10, 2009 is for the December 2008 data. The spreadsheet contains all data submitted by the permittee during the current permit term through 2011. I have also attached a copy of the DMRs for 2012.

From: Margaret_Byrne@fws.gov [mailto:Margaret_Byrne@fws.gov]
Sent: Monday, August 20, 2012 11:41 AM
To: France, Becky (DEQ)
Cc: susan_lingenfelser@fws.gov
Subject: Request for information for Endangered Species Review Request

Hello Becky,

Attachment F

Wasteload and Limit Calculations

- **Mixing Zone Calculations (MIXER 2.1)**
- **Effluent Data**
- **Wasteload Allocation Spreadsheet**
- **Antidegradation Wasteload Allocation Spreadsheet**
- **STATS Program Results (Ammonia, TRC)**

Mixing Zone Predictions for Mountain Lake Biological Station

Effluent Flow = 0.009 MGD
Stream 7Q10 = 0.11 MGD
Stream 30Q10 = 0.14 MGD
Stream 1Q10 = 0.10 MGD
Stream slope = 0.058 ft/ft
Stream width = 4.5 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .0732 ft
Length = 167.18 ft
Velocity = .5589 ft/sec
Residence Time = .0035 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = .0838 ft
Length = 149.12 ft
Velocity = .6104 ft/sec
Residence Time = .0028 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = .0691 ft
Length = 176.13 ft
Velocity = .5401 ft/sec
Residence Time = .0906 hours

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.

Mountain Lake Biological Station WWTP
VA0075361

Effluent pH (S.U.)

Date Due	min	max
10-Jul-08	7.05	7.68
10-Aug-08	7.21	7.93
10-Sep-08	7.33	7.86
10-Jun-09	6.3	6.6
10-July-09*	6.1	7.44
10-Aug-09	6	7.2
10-Sep-09	6.2	7.7
10-Oct-09	6	6.2
10-Nov-09	6.2	7.3
10-Jul-10	6.3	7.8
10-Aug-10	7	7.6
10-Sep-10	7	7.4
10-Jun-11	6.8	7.3
10-Jul-11	7.1	7.8
10-Aug-11	7	7.6
10-Sep-11	7.1	7.6
10-Jun-12	6.8	8.5
10-Jul-12	6.7	8
10-Aug-12	6.7	7.8
10-Sep-12	6.5	7.8
10-Oct-12	7.2	7.9

90th Percentile pH	7.9	S.U.
10th Percentile pH	6.1	S.U.

* A pH of 10.6 S.U. taken on 6/3/09 was not used for this calculation because measurement was believed to be due to operator error.

Mountain Lake Biological Station WWTP
VPDES Permit No. VA0075361
(Outfall 001)

Date Due	Flow (MGD)	Ammonia (mg/L)		$cBOD_5$ (mg/L)		DO (mg/L)	TSS (mg/L)	
	Average	Average	Maximum	Average	Maximum	Minimum	Average	Maximum
Limits	**0.009**	**1.8**	**1.8**	**20**	**30**	**7.1**	**30**	**45**
10-Jul-08	0.0042	<QL	<QL	3.333	5	7.11	1	1
10-Aug-08	0.0049	<QL	<QL	9.4	16	7.19	3	3
10-Sep-08	0.0033	<QL	<QL	15	15	7.39	5	5
10-Jun-09	0.005	<QL	<QL	5	5	**0.6**	9	9
10-Jul-09	0.003	<QL	<QL	10	28	**0.7**	5	5
10-Aug-09	0.004	**12.2**	9.7	8	9	7.2	19	25
10-Sep-09	0.002	**4.8**	**6.9**	3	8	7.1	13	18
10-Oct-09	0.002	1.4	1.4	1	5	7	30	31
10-Nov-09	0.003	<QL	<QL	3	5	**6.9**	15	15
10-Jul-10	0.006	<QL	<QL	2	5	**6**	12	12
10-Aug-10	0.0003	<QL	<QL	5	7	7	15	15
10-Sep-10	0.001	<QL	<QL	11	12	7	26	26
10-Jun-11	0.002	<QL	<QL	**11**	16	**2.3**	18	33
10-Jul-11	0.001	<QL	<QL	7	8	**5.5**	16	16
10-Aug-11	0.004	<QL	<QL	5	7	8	12	12
10-Sep-11	0.003	0.8	0.8	4	7	8.1	9	9
10-Jun-12	0.003	<QL	<QL	7	22	7.5	13	13
10-Jul-12	0.003	**8.3**	**14.5**	5	10	7.1	8	8
10-Aug-12	0.003	<QL	<QL	1	7	7.1	10	10
10-Sep-12	0.002	<QL	<QL	1	5	7.3	3	3
10-Oct-12	0.002	0.4	0.4	3	9	7.1	6	6

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Mountain Lake Biological Station WWTP Permit No.: VA0075361

Receiving Stream: Hunter Creek, UT (intermittent section)

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	25	mg/L
90% Temperature (Annual) =	17.1	deg C
90% Temperature (Wet season) =	17.1	deg C
90% Maximum pH =	8.52	SU
10% Maximum pH =	7.4	SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	y	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	0	MGD
7Q10 (Annual) =	0	MGD
30Q10 (Annual) =	0	MGD
1Q10 (Wet season) =	0	MGD
30Q10 (Wet season)	0	MGD
30Q5 =	0	MGD
Harmonic Mean =	0	MGD

Mixing Information

Annual - 1Q10 Mix =	100	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information

Mean Hardness (as CaCO3) =	25	mg/L
90% Temp (Annual) =	20	deg C
90% Temp (Wet season) =	20	deg C
90% Maximum pH =	7.9	SU
10% Maximum pH =	6.1	SU
Discharge Flow =	0.009	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	9.9E+02	--	--	--	--	--	--	--	--	--	--	na	9.9E+02
Acrolein	0	--	--	na	9.3E+00	--	--	na	9.3E+00	--	--	--	--	--	--	--	--	--	--	na	9.3E+00
Acrylonitrile [C]	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	--	--	--	--	--	--	--	--	na	2.5E+00
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.0E-04	--	--	--	--	--	--	--	--	3.0E+00	--	na	5.0E-04
Ammonia-N (mg/l) (Yearly)	0	6.77E+00	1.96E+00	na	--	6.8E+00	2.0E+00	na	--	--	--	--	--	--	--	--	--	6.8E+00	2.0E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	6.77E+00	1.96E+00	na	--	6.8E+00	2.0E+00	na	--	--	--	--	--	--	--	--	--	6.8E+00	2.0E+00	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	4.0E+04	--	--	--	--	--	--	--	--	--	--	na	4.0E+04
Antimony	0	--	--	na	6.4E+02	--	--	na	6.4E+02	--	--	--	--	--	--	--	--	--	--	na	6.4E+02
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	3.4E+02	1.5E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	--	--	--	--	--	--	--	--	na	5.1E+02
Benzidine [C]	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	--	--	--	--	--	--	--	--	na	2.0E-03
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	--	--	--	--	--	--	--	--	na	5.3E+00
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	6.5E+04	--	--	--	--	--	--	--	--	--	--	na	6.5E+04
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	--	--	na	2.2E+01
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	na	1.4E+03
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	na	1.9E+03
Cadmium	0	8.2E-01	3.8E-01	na	--	8.2E-01	3.8E-01	na	--	--	--	--	--	--	--	--	--	8.2E-01	3.8E-01	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	na	1.6E+01
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	4.3E-03	na	8.1E-03	--	--	--	--	--	--	--	--	2.4E+00	4.3E-03	na	8.1E-03
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	8.6E+05	2.3E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.9E+01	1.1E+01	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	na	1.6E+03

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	--	--	na	1.3E+02
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	na	1.6E+03
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	--	--	--	--	--	--	--	--	8.3E-02	4.1E-02	na	--
Chromium III	0	1.8E+02	2.4E+01	na	--	1.8E+02	2.4E+01	na	--	--	--	--	--	--	--	--	--	1.8E+02	2.4E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	--	--	--	--	--	--	--	--	na	1.8E-02
Copper	1.61	3.6E+00	2.7E+00	na	--	3.6E+00	2.7E+00	na	--	--	--	--	--	--	--	--	--	3.6E+00	2.7E+00	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	5.2E+00	na	1.6E+04	--	--	--	--	--	--	--	--	2.2E+01	5.2E+00	na	1.6E+04
DDD [C]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	--	--	na	3.1E-03
DDE [C]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	--	--	na	2.2E-03
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.0E-03	na	2.2E-03	--	--	--	--	--	--	--	--	1.1E+00	1.0E-03	na	2.2E-03
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	1.7E-01	na	--	--	--	--	--	--	--	--	--	1.7E-01	1.7E-01	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	--	--	na	1.3E+03
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	9.6E+02	--	--	--	--	--	--	--	--	--	--	na	9.6E+02
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	1.9E+02	--	--	--	--	--	--	--	--	--	--	na	1.9E+02
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	--	--	--	--	--	--	--	--	na	2.8E-01
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	na	1.7E+02
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	--	--	na	3.7E+02
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	7.1E+03	--	--	--	--	--	--	--	--	--	--	na	7.1E+03
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	na	1.0E+04
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	2.9E+02	--	--	--	--	--	--	--	--	--	--	na	2.9E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	--	--	--	--	--	--	--	--	na	2.1E+02
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	5.6E-02	na	5.4E-04	--	--	--	--	--	--	--	--	2.4E-01	5.6E-02	na	5.4E-04
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	4.4E+04	--	--	--	--	--	--	--	--	--	--	na	4.4E+04
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	8.5E+02	--	--	--	--	--	--	--	--	--	--	na	8.5E+02
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.1E+06	--	--	--	--	--	--	--	--	--	--	na	1.1E+06
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	4.5E+03	--	--	--	--	--	--	--	--	--	--	na	4.5E+03
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	--	--	--	--	--	--	--	--	na	5.3E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	2.8E+02	--	--	--	--	--	--	--	--	--	--	na	2.8E+02
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	--	--	--	--	--	--	--	--	na	3.4E+01
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	5.1E-08	--	--	--	--	--	--	--	--	--	--	na	5.1E-08
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	--	--	--	--	--	--	--	--	na	2.0E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	8.9E+01
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	8.9E+01
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	5.6E-02	--	--	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	--	--	na	8.9E+01
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.6E-02	3.6E-02	na	6.0E-02	--	--	--	--	--	--	--	--	8.6E-02	3.6E-02	na	6.0E-02
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	3.0E-01	--	--	--	--	--	--	--	--	--	--	na	3.0E-01

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	2.1E+03	--	--	--	--	--	--	--	--	--	--	na	2.1E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	--	--	--	--	--	--	--	--	na	5.3E+03
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	--	1.0E-02	na	--
Heptachlor [c]	0	5.2E-01	3.8E-03	na	7.9E-04	5.2E-01	3.8E-03	na	7.9E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	7.9E-04
Heptachlor Epoxide[c]	0	5.2E-01	3.8E-03	na	3.9E-04	5.2E-01	3.8E-03	na	3.9E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	3.9E-04
Hexachlorobenzene[c]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	--	--	--	--	--	--	--	--	na	2.9E-03
Hexachlorobutadiene[c]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+02
Hexachlorocyclohexane Alpha-BHC[c]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	--	--	--	--	--	--	--	--	na	4.9E-02
Hexachlorocyclohexane Beta-BHC[c]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	--	--	--	--	--	--	--	--	na	1.7E-01
Hexachlorocyclohexane Gamma-BHC[c] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.5E-01	--	na	1.8E+00	--	--	--	--	--	--	--	--	9.5E-01	--	na	1.8E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	--	--	na	1.1E+03
Hexachloroethane[c]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	na	3.3E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	--	2.0E+00	na	--
Indeno (1,2,3-cd) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[c]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	--	--	na	9.6E+03
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	2.0E+01	2.3E+00	na	--	2.0E+01	2.3E+00	na	--	--	--	--	--	--	--	--	--	2.0E+01	2.3E+00	na	--
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Manganese	78.9	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.4E+00	7.7E-01	--	--	--	--	--	--	--	--	--	--	1.4E+00	7.7E-01	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	na	1.5E+03
Methylene Chloride [c]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	--	--	na	5.9E+03
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	--	3.0E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	5.6E+01	6.3E+00	na	4.6E+03	5.6E+01	6.3E+00	na	4.6E+03	--	--	--	--	--	--	--	--	5.6E+01	6.3E+00	na	4.6E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	6.9E+02	--	--	--	--	--	--	--	--	--	--	na	6.9E+02
N-Nitrosodimethylamine[c]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	--	--	--	--	--	--	--	--	na	3.0E+01
N-Nitrosodiphenylamine[c]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	--	--	na	6.0E+01
N-Nitrosodi-n-propylamine[c]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	--	--	--	--	--	--	--	--	na	5.1E+00
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	6.6E+00	na	--	--	--	--	--	--	--	--	--	2.8E+01	6.6E+00	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	6.5E-02	1.3E-02	na	--
PCB Total[c]	0	--	1.4E-02	na	6.4E-04	--	1.4E-02	na	6.4E-04	--	--	--	--	--	--	--	--	--	1.4E-02	na	6.4E-04
Pentachlorophenol [c]	0	3.5E+00	2.7E+00	na	3.0E+01	3.5E+00	2.7E+00	na	3.0E+01	--	--	--	--	--	--	--	--	3.5E+00	2.7E+00	na	3.0E+01
Phenol	0	--	--	na	8.6E+05	--	--	na	8.6E+05	--	--	--	--	--	--	--	--	--	--	na	8.6E+05
Pyrene	0	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	--	--	na	4.0E+03
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.0E+00	--	--	--	--	--	--	--	--	--	--	na	4.0E+00
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	5.0E+00	na	4.2E+03	--	--	--	--	--	--	--	--	**2.0E+01**	**5.0E+00**	**na**	**4.2E+03**
Silver	0	3.2E-01	--	na	--	3.2E-01	--	na	--	--	--	--	--	--	--	--	--	**3.2E-01**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+01**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.3E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	4.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.7E-01**
Toluene	0	--	--	na	6.0E+03	--	--	na	6.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.0E+03**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	7.3E-01	2.0E-04	na	2.8E-03	--	--	--	--	--	--	--	--	**7.3E-01**	**2.0E-04**	**na**	**2.8E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	7.2E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**7.2E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	7.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.0E+01**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+02**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.0E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
Zinc	7.26	3.6E+01	3.6E+01	na	2.6E+04	3.6E+01	3.6E+01	na	2.6E+04	--	--	--	--	--	--	--	--	**3.6E+01**	**3.6E+01**	**na**	**2.6E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	6.4E+02
Arsenic	9.0E+01
Barium	na
Cadmium	2.3E-01
Chromium III	1.4E+01
Chromium VI	6.4E+00
Copper	1.5E+00
Iron	na
Lead	1.4E+00
Manganese	na
Mercury	4.6E-01
Nickel	3.8E+00
Selenium	3.0E+00
Silver	1.3E-01
Zinc	1.4E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

0.009 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGI 0.009

	Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	0.000	0.000	0.009	0.009
7Q10	0.000	N/A	0.009	N/A
30Q10	0.000	0.000	0.009	0.009
30Q5	0.000	N/A	0.009	N/A
Harm. Mean	0.000	N/A	0.009	N/A
Annual Avg.	0.000	N/A	0.009	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	20.000	20.000
30Q10 90th% Temp. Mix (deg C)	20.000	20.000
1Q10 90th% pH Mix (SU)	7.900	7.900
30Q10 90th% pH Mix (SU)	7.900	7.900
1Q10 10th% pH Mix (SU)	6.100	N/A
7Q10 10th% pH Mix (SU)	6.100	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	25.0	25.0
7Q10 Hardness (mg/L as CaCO3)	25.0	25.0

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.900
(7.204 - pH)	-0.696
(pH - 7.204)	0.696
Trout Present Criterion (mg N/I	6.766
Trout Absent Criterion (mg N/L	10.131
Trout Present?	y
Effective Criterion (mg N/L)	6.766

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	20.000
90th Percentile pH (SU)	7.900
MIN	2.002
MAX	20.000
(7.688 - pH)	-0.212
(pH - 7.688)	0.212
Early LS Present Criterion (mg N	1.965
Early LS Absent Criterion (mg N/	1.965
Early Life Stages Present?	y
Effective Criterion (mg N/L)	1.965

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.900
(7.204 - pH)	-0.696
(pH - 7.204)	0.696
Trout Present Criterion (mg N/I	6.766
Trout Absent Criterion (mg N/L	10.131
Trout Present?	y
Effective Criterion (mg N/L)	6.766

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	20.000
90th Percentile pH (SU)	7.900
MIN	2.002
MAX	20.000
(7.688 - pH)	-0.212
(pH - 7.688)	0.212
Early LS Present Criterion (mg N	1.965
Early LS Absent Criterion (mg N/	1.965
Early Life Stages Present?	y
Effective Criterion (mg N/L)	1.965

0.009 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGI 0.009

	100% Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	0.000	0.000	0.009	0.009
7Q10	0.000	N/A	0.009	N/A
30Q10	0.000	0.000	0.009	0.009
30Q5	0.000	N/A	0.009	N/A
Harm. Mean	0.000	N/A	0.009	N/A
Annual Avg.	0.000	N/A	0.009	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	20.000	20.000
30Q10 90th% Temp. Mix (deg C)	20.000	20.000
1Q10 90th% pH Mix (SU)	7.900	7.900
30Q10 90th% pH Mix (SU)	7.900	7.900
1Q10 10th% pH Mix (SU)	6.100	N/A
7Q10 10th% pH Mix (SU)	6.100	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	25.000	25.000
7Q10 Hardness (mg/L as CaCO3) =	25.000	25.000

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.900
(7.204 - pH)	-0.696
(pH - 7.204)	0.696
Trout Present Criterion (mg N/I	6.766
Trout Absent Criterion (mg N/L	10.131
Trout Present?	y
Effective Criterion (mg N/L)	6.766

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	20.000
90th Percentile pH (SU)	7.900
MIN	2.002
MAX	20.000
(7.688 - pH)	-0.212
(pH - 7.688)	0.212
Early LS Present Criterion (mg N	1.965
Early LS Absent Criterion (mg N/	1.965
Early Life Stages Present?	y
Effective Criterion (mg N/L)	1.965

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.900
(7.204 - pH)	-0.696
(pH - 7.204)	0.696
Trout Present Criterion (mg N/I	6.766
Trout Absent Criterion (mg N/L	10.131
Trout Present?	y
Effective Criterion (mg N/L)	6.766

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	20.000
90th Percentile pH (SU)	7.900
MIN	2.002
MAX	20.000
(7.688 - pH)	-0.212
(pH - 7.688)	0.212
Early LS Present Criterion (mg N	1.965
Early LS Absent Criterion (mg N/	1.965
Early Life Stages Present?	y
Effective Criterion (mg N/L)	1.965

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Mountain Lake Biological Station WWTP Permit No.: VA0075361

Receiving Stream: Pond Drain (perennial section) Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		
Mean Hardness (as CaCO3) =	25	mg/L
90% Temperature (Annual) =	17.1	deg C
90% Temperature (Wet season) =	17.1	deg C
90% Maximum pH =	8.52	SU
10% Maximum pH =	7.4	SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	y	
Early Life Stages Present Y/N? =	y	

Stream Flows		
1Q10 (Annual) =	0.1	MGD
7Q10 (Annual) =	0.11	MGD
30Q10 (Annual) =	0.14	MGD
1Q10 (Wet season) =	0.15	MGD
30Q10 (Wet season)	0.31	MGD
30Q5 =	0.16	MGD
Harmonic Mean =	0.5	MGD

Mixing Information		
Annual - 1Q10 Mix =	100	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information		
Mean Hardness (as CaCO3) =	25	mg/L
90% Temp (Annual) =	20	deg C
90% Temp (Wet season) =	20	deg C
90% Maximum pH =	7.9	SU
10% Maximum pH =	6.1	SU
Discharge Flow =	0.009	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.9E+04	--	--	--	--	--	--	--	--	--	--	na	1.9E+04
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	na	1.7E+02
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+02
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.6E+01	--	na	2.8E-02	--	--	--	--	--	--	--	--	3.6E+01	--	na	2.8E-02
Ammonia-N (mg/l) (Yearly)	0	2.50E+00	1.00E+00	na	--	3.0E+01	1.7E+01	na	--	--	--	--	--	--	--	--	--	3.0E+01	1.7E+01	na	--
Ammonia-N (mg/l) (High Flow)	0	2.36E+00	9.45E-01	na	--	4.2E+01	3.3E+01	na	--	--	--	--	--	--	--	--	--	4.2E+01	3.3E+01	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	7.5E+05	--	--	--	--	--	--	--	--	--	--	na	7.5E+05
Antimony	0	--	--	na	6.4E+02	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
Arsenic	0	3.4E+02	1.5E+02	na	--	4.1E+03	2.0E+03	na	--	--	--	--	--	--	--	--	--	4.1E+03	2.0E+03	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	2.9E+04	--	--	--	--	--	--	--	--	--	--	na	2.9E+04
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	1.1E-01	--	--	--	--	--	--	--	--	--	--	na	1.1E-01
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.0E+01	--	--	--	--	--	--	--	--	--	--	na	1.0E+01
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.0E+01	--	--	--	--	--	--	--	--	--	--	na	1.0E+01
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.0E+01	--	--	--	--	--	--	--	--	--	--	na	1.0E+01
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.0E+01	--	--	--	--	--	--	--	--	--	--	na	1.0E+01
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	na	3.0E+02
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.2E+06	--	--	--	--	--	--	--	--	--	--	na	1.2E+06
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	1.2E+03	--	--	--	--	--	--	--	--	--	--	na	1.2E+03
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	7.9E+04	--	--	--	--	--	--	--	--	--	--	na	7.9E+04
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.6E+04	--	--	--	--	--	--	--	--	--	--	na	3.6E+04
Cadmium	0	8.2E-01	3.8E-01	na	--	9.9E+00	5.0E+00	na	--	--	--	--	--	--	--	--	--	9.9E+00	5.0E+00	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	9.0E+02	--	--	--	--	--	--	--	--	--	--	na	9.0E+02
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	2.9E+01	5.7E-02	na	4.6E-01	--	--	--	--	--	--	--	--	2.9E+01	5.7E-02	na	4.6E-01
Chloride	0	8.6E+05	2.3E+05	na	--	1.0E+07	3.0E+06	na	--	--	--	--	--	--	--	--	--	1.0E+07	3.0E+06	na	--
TRC	0	1.9E+01	1.1E+01	na	--	2.3E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	2.3E+02	1.5E+02	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	3.0E+04	--	--	--	--	--	--	--	--	--	--	na	3.0E+04

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	7.4E+03	--	--	--	--	--	--	--	--	--	--	na	7.4E+03
Chloroform	0	--	--	na	1.1E+04	--	--	na	2.1E+05	--	--	--	--	--	--	--	--	--	--	na	2.1E+05
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	3.0E+04	--	--	--	--	--	--	--	--	--	--	na	3.0E+04
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	2.8E+03	--	--	--	--	--	--	--	--	--	--	na	2.8E+03
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.0E+00	5.4E-01	na	--	--	--	--	--	--	--	--	--	1.0E+00	5.4E-01	na	--
Chromium III	0	1.8E+02	2.4E+01	na	--	2.2E+03	3.1E+02	na	--	--	--	--	--	--	--	--	--	2.2E+03	3.1E+02	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.9E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	1.9E+02	1.5E+02	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	1.0E+00	--	--	--	--	--	--	--	--	--	--	na	1.0E+00
Copper	1.61	3.6E+00	2.7E+00	na	--	2.6E+01	1.7E+01	na	--	--	--	--	--	--	--	--	--	2.6E+01	1.7E+01	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.7E+02	6.9E+01	na	3.0E+05	--	--	--	--	--	--	--	--	2.7E+02	6.9E+01	na	3.0E+05
DDD [C]	0	--	--	na	3.1E-03	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
DDE [C]	0	--	--	na	2.2E-03	--	--	na	1.2E-01	--	--	--	--	--	--	--	--	--	--	na	1.2E-01
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.3E+01	1.3E-02	na	1.2E-01	--	--	--	--	--	--	--	--	1.3E+01	1.3E-02	na	1.2E-01
Demeton	0	--	1.0E-01	na	--	--	1.3E+00	na	--	--	--	--	--	--	--	--	--	--	1.3E+00	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	2.1E+00	2.2E+00	na	--	--	--	--	--	--	--	--	--	2.1E+00	2.2E+00	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.0E+01	--	--	--	--	--	--	--	--	--	--	na	1.0E+01
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.4E+04	--	--	--	--	--	--	--	--	--	--	na	2.4E+04
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.8E+04	--	--	--	--	--	--	--	--	--	--	na	1.8E+04
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.6E+03	--	--	--	--	--	--	--	--	--	--	na	3.6E+03
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	na	1.6E+01
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	--	--	na	9.6E+03
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	--	--	na	2.1E+04
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.3E+05	--	--	--	--	--	--	--	--	--	--	na	1.3E+05
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.9E+05	--	--	--	--	--	--	--	--	--	--	na	1.9E+05
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	5.4E+03	--	--	--	--	--	--	--	--	--	--	na	5.4E+03
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	8.5E+03	--	--	--	--	--	--	--	--	--	--	na	8.5E+03
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.9E+00	7.4E-01	na	3.1E-02	--	--	--	--	--	--	--	--	2.9E+00	7.4E-01	na	3.1E-02
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	8.3E+05	--	--	--	--	--	--	--	--	--	--	na	8.3E+05
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.6E+04	--	--	--	--	--	--	--	--	--	--	na	1.6E+04
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	2.1E+07	--	--	--	--	--	--	--	--	--	--	na	2.1E+07
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	8.5E+04	--	--	--	--	--	--	--	--	--	--	na	8.5E+04
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	1.0E+05	--	--	--	--	--	--	--	--	--	--	na	1.0E+05
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	5.3E+03	--	--	--	--	--	--	--	--	--	--	na	5.3E+03
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	na	1.9E+03
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	9.6E-07	--	--	--	--	--	--	--	--	--	--	na	9.6E-07
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	1.1E+02	--	--	--	--	--	--	--	--	--	--	na	1.1E+02
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.7E+00	7.4E-01	na	1.7E+03	--	--	--	--	--	--	--	--	2.7E+00	7.4E-01	na	1.7E+03
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.7E+00	7.4E-01	na	1.7E+03	--	--	--	--	--	--	--	--	2.7E+00	7.4E-01	na	1.7E+03
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.7E+00	7.4E-01	--	--	--	--	--	--	--	--	--	--	2.7E+00	7.4E-01	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	1.0E+00	4.8E-01	na	1.1E+00	--	--	--	--	--	--	--	--	1.0E+00	4.8E-01	na	1.1E+00
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	5.6E+00	--	--	--	--	--	--	--	--	--	--	na	5.6E+00

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	3.9E+04	--	--	--	--	--	--	--	--	--	--	na	3.9E+04
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	--	--	na	2.6E+03
Fluorene	0	--	--	na	5.3E+03	--	--	na	1.0E+05	--	--	--	--	--	--	--	--	--	--	na	1.0E+05
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.3E-01	na	--	--	--	--	--	--	--	--	--	--	1.3E-01	na	--
Heptachlor [c]	0	5.2E-01	3.8E-03	na	7.9E-04	6.3E+00	5.0E-02	na	4.5E-02	--	--	--	--	--	--	--	--	6.3E+00	5.0E-02	na	4.5E-02
Heptachlor Epoxide[c]	0	5.2E-01	3.8E-03	na	3.9E-04	6.3E+00	5.0E-02	na	2.2E-02	--	--	--	--	--	--	--	--	6.3E+00	5.0E-02	na	2.2E-02
Hexachlorobenzene[c]	0	--	--	na	2.9E-03	--	--	na	1.6E-01	--	--	--	--	--	--	--	--	--	--	na	1.6E-01
Hexachlorobutadiene[c]	0	--	--	na	1.8E+02	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	na	1.0E+04
Hexachlorocyclohexane Alpha-BHC[c]	0	--	--	na	4.9E-02	--	--	na	2.8E+00	--	--	--	--	--	--	--	--	--	--	na	2.8E+00
Hexachlorocyclohexane Beta-BHC[c]	0	--	--	na	1.7E-01	--	--	na	9.6E+00	--	--	--	--	--	--	--	--	--	--	na	9.6E+00
Hexachlorocyclohexane Gamma-BHC[c] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.2E+01	--	na	1.0E+02	--	--	--	--	--	--	--	--	1.2E+01	--	na	1.0E+02
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	--	--	na	2.1E+04
Hexachloroethane[c]	0	--	--	na	3.3E+01	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	na	1.9E+03
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.6E+01	na	--	--	--	--	--	--	--	--	--	--	2.6E+01	na	--
Indeno (1,2,3-cd) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.0E+01	--	--	--	--	--	--	--	--	--	--	na	1.0E+01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[c]	0	--	--	na	9.6E+03	--	--	na	5.4E+05	--	--	--	--	--	--	--	--	--	--	na	5.4E+05
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	2.0E+01	2.3E+00	na	--	2.5E+02	3.1E+01	na	--	--	--	--	--	--	--	--	--	2.5E+02	3.1E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.3E+00	na	--	--	--	--	--	--	--	--	--	--	1.3E+00	na	--
Manganese	78.9	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.7E+01	1.0E+01	--	--	--	--	--	--	--	--	--	--	1.7E+01	1.0E+01	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	2.8E+04	--	--	--	--	--	--	--	--	--	--	na	2.8E+04
Methylene Chloride [c]	0	--	--	na	5.9E+03	--	--	na	3.3E+05	--	--	--	--	--	--	--	--	--	--	na	3.3E+05
Methoxychlor	0	--	3.0E-02	na	--	--	4.0E-01	na	--	--	--	--	--	--	--	--	--	--	4.0E-01	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	5.6E+01	6.3E+00	na	4.6E+03	6.8E+02	8.3E+01	na	8.6E+04	--	--	--	--	--	--	--	--	6.8E+02	8.3E+01	na	8.6E+04
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.3E+04	--	--	--	--	--	--	--	--	--	--	na	1.3E+04
N-Nitrosodimethylamine[c]	0	--	--	na	3.0E+01	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03
N-Nitrosodiphenylamine[c]	0	--	--	na	6.0E+01	--	--	na	3.4E+03	--	--	--	--	--	--	--	--	--	--	na	3.4E+03
N-Nitrosodi-n-propylamine[c]	0	--	--	na	5.1E+00	--	--	na	2.9E+02	--	--	--	--	--	--	--	--	--	--	na	2.9E+02
Nonylphenol	0	2.8E+01	6.6E+00	--	--	3.4E+02	8.7E+01	na	--	--	--	--	--	--	--	--	--	3.4E+02	8.7E+01	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	7.9E-01	1.7E-01	na	--	--	--	--	--	--	--	--	--	7.9E-01	1.7E-01	na	--
PCB Total[c]	0	--	1.4E-02	na	6.4E-04	--	1.9E-01	na	3.6E-02	--	--	--	--	--	--	--	--	--	1.9E-01	na	3.6E-02
Pentachlorophenol [c]	0	8.6E+00	6.8E+00	na	3.0E+01	1.0E+02	9.0E+01	na	1.7E+03	--	--	--	--	--	--	--	--	1.0E+02	9.0E+01	na	1.7E+03
Phenol	0	--	--	na	8.6E+05	--	--	na	1.6E+07	--	--	--	--	--	--	--	--	--	--	na	1.6E+07
Pyrene	0	--	--	na	4.0E+03	--	--	na	7.5E+04	--	--	--	--	--	--	--	--	--	--	na	7.5E+04
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	7.5E+01	--	--	--	--	--	--	--	--	--	--	na	7.5E+01
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.4E+02	6.6E+01	na	7.9E+04	--	--	--	--	--	--	--	--	**2.4E+02**	**6.6E+01**	**na**	**7.9E+04**
Silver	0	3.2E-01	--	na	--	3.8E+00	--	na	--	--	--	--	--	--	--	--	--	**3.8E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	2.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.3E+03**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.9E+03**
Thallium	0	--	--	na	4.7E-01	--	--	na	8.8E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.8E+00**
Toluene	0	--	--	na	6.0E+03	--	--	na	1.1E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+05**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	8.8E+00	2.6E-03	na	1.6E-01	--	--	--	--	--	--	--	--	**8.8E+00**	**2.6E-03**	**na**	**1.6E-01**
Tributyltin	0	4.6E-01	7.2E-02	na	--	5.6E+00	9.5E-01	na	--	--	--	--	--	--	--	--	--	**5.6E+00**	**9.5E-01**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+03**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	9.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.0E+03**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+04**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+03**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+03**
Zinc	7.26	3.6E+01	3.6E+01	na	2.6E+04	3.6E+02	3.9E+02	na	4.9E+05	--	--	--	--	--	--	--	--	**3.6E+02**	**3.9E+02**	**na**	**4.9E+05**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.2E+04
Arsenic	1.2E+03
Barium	na
Cadmium	3.0E+00
Chromium III	1.9E+02
Chromium VI	7.8E+01
Copper	9.9E+00
Iron	na
Lead	1.8E+01
Manganese	na
Mercury	6.1E+00
Nickel	5.0E+01
Selenium	4.0E+01
Silver	1.5E+00
Zinc	1.4E+02

Note: do not use QL's lower than the minimum QL's provided in agency guidance

0.009 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGD 0.009

	Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	0.100	0.150	0.109	0.159
7Q10	0.110	N/A	0.119	N/A
30Q10	0.140	0.310	0.149	0.319
30Q5	0.160	N/A	0.169	N/A
Harm. Mean	0.500	N/A	0.509	N/A
Annual Avg.	0.000	N/A	0.009	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	17.339	17.264
30Q10 90th% Temp. Mix (deg C)	17.275	17.182
1Q10 90th% pH Mix (SU)	8.419	8.448
30Q10 90th% pH Mix (SU)	8.444	8.483
1Q10 10th% pH Mix (SU)	6.991	N/A
7Q10 10th% pH Mix (SU)	7.014	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	25.0	25.0
7Q10 Hardness (mg/L as CaCO3)	25.0	25.0

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.419
(7.204 - pH)	-1.215
(pH - 7.204)	1.215
Trout Present Criterion (mg N/l	2.500
Trout Absent Criterion (mg N/L	3.742
Trout Present?	y
Effective Criterion (mg N/L)	2.500

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	17.275
90th Percentile pH (SU)	8.444
MIN	2.386
MAX	17.275
(7.688 - pH)	-0.756
(pH - 7.688)	0.756
Early LS Present Criterion (mg N	1.003
Early LS Absent Criterion (mg N/	1.003
Early Life Stages Present?	y
Effective Criterion (mg N/L)	1.003

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.448
(7.204 - pH)	-1.244
(pH - 7.204)	1.244
Trout Present Criterion (mg N/l	2.362
Trout Absent Criterion (mg N/L	3.537
Trout Present?	y
Effective Criterion (mg N/L)	2.362

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.182
90th Percentile pH (SU)	8.483
MIN	2.400
MAX	17.182
(7.688 - pH)	-0.795
(pH - 7.688)	0.795
Early LS Present Criterion (mg N	0.945
Early LS Absent Criterion (mg N/	0.945
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.945

0.009 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGD 0.009

	100% Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	0.100	0.150	0.109	0.159
7Q10	0.110	N/A	0.119	N/A
30Q10	0.140	0.310	0.149	0.319
30Q5	0.160	N/A	0.169	N/A
Harm. Mean	0.500	N/A	0.509	N/A
Annual Avg.	0.000	N/A	0.009	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	17.339	17.264
30Q10 90th% Temp. Mix (deg C)	17.275	17.182
1Q10 90th% pH Mix (SU)	8.419	8.448
30Q10 90th% pH Mix (SU)	8.444	8.483
1Q10 10th% pH Mix (SU)	6.991	N/A
7Q10 10th% pH Mix (SU)	7.014	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	25.000	25.000
7Q10 Hardness (mg/L as CaCO3) =	25.000	25.000

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.419
(7.204 - pH)	-1.215
(pH - 7.204)	1.215
Trout Present Criterion (mg N/l	2.500
Trout Absent Criterion (mg N/L	3.742
Trout Present?	y
Effective Criterion (mg N/L)	2.500

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	17.275
90th Percentile pH (SU)	8.444
MIN	2.386
MAX	17.275
(7.688 - pH)	-0.756
(pH - 7.688)	0.756
Early LS Present Criterion (mg N	1.003
Early LS Absent Criterion (mg N/	1.003
Early Life Stages Present?	y
Effective Criterion (mg N/L)	1.003

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.448
(7.204 - pH)	-1.244
(pH - 7.204)	1.244
Trout Present Criterion (mg N/l	2.362
Trout Absent Criterion (mg N/L	3.537
Trout Present?	y
Effective Criterion (mg N/L)	2.362

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.182
90th Percentile pH (SU)	8.483
MIN	2.400
MAX	17.182
(7.688 - pH)	-0.795
(pH - 7.688)	0.795
Early LS Present Criterion (mg N	0.945
Early LS Absent Criterion (mg N/	0.945
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.945

Calculation of Waste Load Allocations using OWRM guidance memo 93-015 amendment no. 1
This spreadsheet uses the Fractional Complete Mix calculated by the 3-95 Mixing Model

WLA Analysis For: Mountain Lake Biological Station VA0075361 Date: 04/18/96

Stream:	UT, Hunter's Branch	Effluent Information					
Mean Hardness (mg/L) =	NA	Mean Hardness=	NA	Hardness	25	Mix Hardness=	0
Stream NH3 (mg/L)	0	NH3 (mg/L)=		7Q10 Ratio	1		
90% Temperature	19.5	90% Temp.=	19.5	1Q10 Ratio	1	* WLAa	
90% pH	7.5	90% pH=	7.5			Coefficient =	0.99
Fractional 7Q10-MGD	0	Discharge-MGD=	0.009			Acute fWC =	1
Fractional 1Q10-MGD	0	*Coefficient of		Harmonic ratio:	1	Chronic fWC =	1
Harmonic mean (carcinogen):		Variability=	0.6	30Q5 ratio:	1		
30Q5 Flow (Non-carcinogen):							
R(iver),L(ake) or S(torm):	R						
Trout Present? (Y/N)	y						
Public Water Supply(Y/N):	N						

			Aquatic Protection Standards		Human Health Standards					
			Acute	Chronic	Public Water Supplies	All Other Surface Waters				
Parameter and Form	Carcinogen?	Present? (Y/N)	Std.	Std.	Std.	Std.	Acute WLA	Chronic WLA	Public Health WLA	Other Waters WLA
Ammonia (mg/l as N)		y	12.028	1.516	None	None	12.03	1.52	N/A	N/A

1993 WQ standard for ammonia used for WLAs

Analysis of the MOUNTAIN LAKE BIOLOGICAL STA effluent data for AMMONIA

1993 ammonia calcs

The statistics for AMMONIA are:

Number of values	=	11
Quantification level	=	.2
Number < quantification	=	0
Expected value	=	7.488213
Variance	=	675.9821
C.V.	=	3.472077
97th percentile	=	42.25543
Statistics used	=	lognormal

The WLAs for AMMONIA are:

Acute WLA	=	12
Chronic WLA	=	1.52
Human Health WLA	=	----

The limits are based on chronic toxicity and 1 samples/month.

Maximum daily limit	=	1.871092
Average monthly limit	=	1.871092

It is recommended that only the maximum daily limit be used.

DATA

0.5
0.6
6.0
1.6
1.7
1.4
0.3
2.2
0.6
31
36

12/20/2012 4:30:45 PM

Facility = Mountain Lake Biological Station WWTP
Chemical = TRC (ug/L)
Chronic averaging period = 4
WLAa = 19
WLAc = 11
Q.L. = 100
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 100
Variance = 3600
C.V. = 0.6
97th percentile daily values = 243.341
97th percentile 4 day average = 166.379
97th percentile 30 day average= 120.605
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 16.0883226245856
Average Weekly limit = 9.59676626920107
Average Monthly LImit = 7.9737131838758

The data are:

100

Attachment G

Water Quality Model Calculations

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
West Central Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Mountain Lake Biological Station (VA0060321)
Modeling Results for Reissuance of VPDES Permit

TO: Dale Phillips
Permit File

FROM: Becky L. France

DATE: February 6, 1998

Attached is the code and regional model output for the discharge from Mountain Lake Biological Station. This model was run to determine DO and BOD_5 limits for a receiving stream that has been reclassified as a trout stream.

The wastewater facility discharges to an unnamed intermittent tributary of Hunters Branch. This tributary eventually flows into Pond Drain about 1.17 miles from the discharge point. Based upon effluent monitoring data, the 90th percentile value for temperature is 19 °C. The stream velocity was derived using the MIX.EXE program found in **Attachment G** of the Statement of Basis. The reaeration coefficicnt (K_a), cBOD Decay Coefficient (K_r), and nBOD Decay Coefficient (K_n) were modified to more accurately reflect stream conditions.

Model Inputs

Reaeration Coefficient (K_a)

The Tsivoglou and Neal slope equation, as given in the User's Manual for the Regional Water Quality Model (Version 3.0), was used to determine the reaeration coefficient.

$$K_a = .025\ (DH/l) * 24$$

where k_a = reaeration coefficient (/day) at 20 °C
DH = change in elevation (ft) = 360 feet
l = length of section (miles) = 1.17 miles

k_a at 20 °C = .025 (360/1.17) * 24 = 185 /day

The maximum standard default value for K_a used in the regional water quality model is 20/day because the Tsivoglou equation has no bounds for rapid changes in elevation. The restriction imposed upon the Tsivoglou equation are not appropriate for this stream. This stream is a fast moving mountain stream with an elevation change of 360 feet over 1.17 miles. The stream at 7Q10 conditions is estimated to be less than an inch deep and half a foot wide. Given these conditions, the stream can be expected to have a high reaeration rate. However, the reaeration coefficient given by the equation appears to be too high due to the stream bed characteristics. A reaeration coeficient of 185/day would be more characteristic of white water. No stream

studies were found for streams as shallow as the receiving stream. Of the stream studies reviewed, there were some k_a values approaching 40/day. Given the shallow stream and high velocity, a k_a of 40/day was chosen for the model.

Instream DO measurements taken below the discharge point in July of 1997 support the assumption of a high reaeration coefficient. The DO concentration of this stream was not significantly different from the background DO of a similar stream used as a control. A copy of the study results is found in **Attachment E**.

cBOD Decay Coefficient (K_r)

Given a BOD_5 limit of 20 mg/l, no removal due to settling is expected. Using the recommendations found in the regional model manual, the stream bed characteristics, and the degree of treatment as guidelines, a rate of .9 /day at 20 °C was chosen for the model. For BOD_5 limits greater than 20 mg/l, a higher decay rate can be expected (1/day).

nBOD Decay Coefficient (K_n)

Based upon the recommended values given in the regional water quality manual, a value of .25/day was chosen for the model.

Other Assumptions

No impacts from benthic demand or photosynthesis were assumed in the model.

CBODu was used in the model based upon a $cBODu/cBOD_5$ ratio of 2.5.

NBOD was based upon the equation converting the ammonia limit of 1.8 to nBOD as follows:

$$nBODu = (TKN - 3.0) \times 4.33$$

Results of Modeling

The model was run based upon discharge limits of BOD_5 = 20 mg/l, DO = 7.1 mg/l, and a nBOD of 7.79 mg/l. These values resulted in a DO that did not drop below 7.0 mg/l for the entire segment. Another model run with a BOD_5 of 20 mg/l and a DO of 7.0 mg/l resulted in violations of the water quality standard of 7.0 mg/l over the stream segment modeled.

After mixing with Pond Drain, the stream standard of 7.0 mg/l is easily maintained due to the dilution ratio of 11 to 1. Another 5 to 1 dilution is achieved when Pond Drain enters Little Stony Creek approximately 1.25 miles downstream.

The following effluent limits are predicted to protect water quality standards:

BOD_5 = 20 mg/l
TKN = 4.8 mg/l
DO = 7.1 mg/l

Mountain Lake Biological Research Station
VA0075361

Streeter-Phelps Dissolved Oxygen Model Calculations

$cBOD_u$ (mg/L)	Effluent Temp °C	V (ft/s)	Q (cfs)	k_1 @ °C	Elevation (ft)	k_2 day^{-1}	Cs (DO) (mg/L)	D_i (initial DO deficit) (mg/L)	DO Limit (mg/L)	$cBOD_5$ Monthly Average Limit (mg/L)	$cBOD_5$ Weekly Average Limit (mg/L)
41	20	0.647	0.0139	0.9	3600	40	7.9	0.89	7.00	16	24

Calculation of Critical DO Deficit (D_c) /Min. DO:

				D_c (mg/L)	minimum DO (mg/L)
0.943734015	0.59204246	0.386813496	0.344264011	0.9029946	7.00

Calculation of Minimum T_c

						T_c ($days^{-1}$)	distance to T_c (ft)
0.025575448	44.4444444	1.059620596	0.943062331	0.0569377	0.403217168	0.0103125	576

$$t_c = 1/(k_2 - k_1)\ \log\{k_2/k_1\ [1 - D_i\ ((k_2 - k_1)/(k_1\ cBOD_u))]\}$$

$$D_c = (k_1\ cBOD_u)/(k_2 - k_2)\ (10\text{^}(-k_1\ t_c) - 10\text{^}(-k_2\ t_c)) + D_i\ 10\text{^}(-k_2\ t_c)$$

$cBOD_u = cBOD_5/2.5$

Dissolved Oxygen Saturation Table Values

Temperature °C	Cs DO (mg/L) sealevel	DO (elevation correction factor)	Cs(DO) (mg/L)
20	9.07	0.874	7.9

Attachment H

Public Notice

PUBLIC NOTICE – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in Giles County, Virginia
PUBLIC COMMENT PERIOD: February 1, 2013 through March 4, 2013 at 4:30 pm
PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater issued by DEQ, under the authority of the State Water Control Board
APPLICANT NAME, ADDRESS, AND PERMIT NUMBER: University of Virginia, Facilities Management, PO Box 400726, Charlottesville, VA 22906-4726, VA0075361
FACILITY NAME AND LOCATION: Mountain Lake Biological Research Station WWTP, 335 Salt Pond Road, Pembroke, VA 24136-9724
PROJECT DESCRIPTION: University of Virginia has applied for a reissuance of a permit for the wastewater treatment plant in Giles County. The applicant proposes to release treated sewage wastewater at a rate of 9,000 gallons per day from the current facility into a water body. Sludge from the treatment process will be hauled to a wastewater treatment plant for further treatment. The facility proposes to release the treated sewage to an unnamed tributary to Hunters Branch in Giles County in the New River/Little Stony Creek Watershed (VAW-N24R). A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: nutrients, organic matter, solids, toxic pollutants
HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by e-mail, fax, or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for a public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if a public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.
CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS, AND ADDITIONAL INFORMATION: Becky L. France; ADDRESS: Virginia Department of Environmental Quality, Blue Ridge Regional Office, 3019 Peters Creek Road, Roanoke, VA 24019-2738; (540) 562-6700; E-MAIL ADDRESS: becky.france@deq.virginia.gov; FAX: (540) 562-6725. The public may review the draft permit and application at the DEQ office named above (by appointment) or may request copies of the documents from the contact person listed above.

Attachment I

EPA Checksheet

Revised 2/2003

State "FY2003 Transmittal Checklist" to Assist in Targeting Municipal and Industrial Individual NPDES Draft Permits for Review

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name: Mountain Lake Biological Research Station WWTP

NPDES Permit Number: VA0075361

Permit Writer Name: Becky L. France

Date: 11/29/12

Major [ ] **Minor [X]** **Industrial [ ]** **Municipal [X]**

I.A. Draft Permit Package Submittal Includes:	Yes	No	N/A
1. Permit Application?	X		
2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)?	X		
3. Copy of Public Notice?	X		
4. Complete Fact Sheet?	X		
5. A Priority Pollutant Screening to determine parameters of concern?			X
6. A Reasonable Potential analysis showing calculated WQBELs?	X		
7. Dissolved Oxygen calculations?	X		
8. Whole Effluent Toxicity Test summary and analysis?			X
9. Permit Rating Sheet for new or modified industrial facilities?			X

I.B. Permit/Facility Characteristics	Yes	No	N/A
1. Is this a new, or currently unpermitted facility?		X	
2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit?	X		
3. Does the fact sheet **or** permit contain a description of the wastewater treatment process?	X		

I.B. Permit/Facility Characteristics – cont. (FY2003)	Yes	No	N/A
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit?		X	
5. Has there been any change in streamflow characteristics since the last permit was developed?	X		
6. Does the permit allow the discharge of new or increased loadings of any pollutants?		X	
7. Does the fact sheet **or** permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	X		
8. Does the facility discharge to a 303(d) listed water?		X	
a. Has a TMDL been developed and approved by EPA for the impaired water?			X
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?			X
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?			X
9. Have any limits been removed, or are any limits less stringent, than those in the current permit? DO lower, but $cBOD_5$ lower; stream DO not lowered	X		
10. Does the permit authorize discharges of storm water?			X
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?		X	
12. Are there any production-based, technology-based effluent limits in the permit?		X	
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		X	
14. Are any WQBELs based on an interpretation of narrative criteria?		X	
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations?		X	
16. Does the permit contain a compliance schedule for any limit or condition?		X	
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?		X	
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?	X		
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		X	
20. Have previous permit, application, and fact sheet been examined?	X		

Part II. NPDES Draft Permit Checklist (FY2003)

Region III NPDES Permit Quality Checklist – for POTWs

(To be completed and included in the record only for POTWs)

II.A. Permit Cover Page/Administration	Yes	No	N/A
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

II.B. Effluent Limits – General Elements	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?			X

II.C. Technology-Based Effluent Limits (POTWs)	Yes	No	N/A
1. Does the permit contain numeric limits for ALL of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	X		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	X		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?			X
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	X		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	X		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)?		X	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			X

II.D. Water Quality-Based Effluent Limits	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL?			X

II.D. Water Quality-Based Effluent Limits – cont. (FY2003)	Yes	No	N/A
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	X		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?			X
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	X		
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the record indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	X		

II.E. Monitoring and Reporting Requirements	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			X
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?		X	
4. Does the permit require testing for Whole Effluent Toxicity?		X	

II.F. Special Conditions	Yes	No	N/A
1. Does the permit include appropriate biosolids use/disposal requirements?	X		
2. Does the permit include appropriate storm water program requirements?			X

II.F. Special Conditions – cont. (FY2003)	Yes	No	N/A
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?			X
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?	X		
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?			X
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?			X
a. Does the permit require implementation of the "Nine Minimum Controls"?			X
b. Does the permit require development and implementation of a "Long Term Control Plan"?			X
c. Does the permit require monitoring and reporting for CSO events?			X
7. Does the permit include appropriate Pretreatment Program requirements?			X

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	X		

List of Standard Conditions – 40 CFR 122.41

Duty to comply	Property rights	Reporting Requirements
Duty to reapply	Duty to provide information	Planned change
Need to halt or reduce activity not a defense	Inspections and entry	Anticipated noncompliance
Duty to mitigate	Monitoring and records	Transfers
Proper O & M	Signatory requirement	Monitoring reports
Permit actions	Bypass	Compliance schedules
	Upset	24-Hour reporting
		Other non-compliance

2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?	X		

Part II. NPDES Draft Permit Checklist (FY2003)

Region III NPDES Permit Quality Review Checklist – For Non-Municipals

(To be completed and included in the record for all non-POTWs)

----------NOT APPLICABLE----------

Part III. Signature Page (FY2003)

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	Becky L. France
Title	Water Permit Writer
Signature	Becky L France
Date	11/29/12